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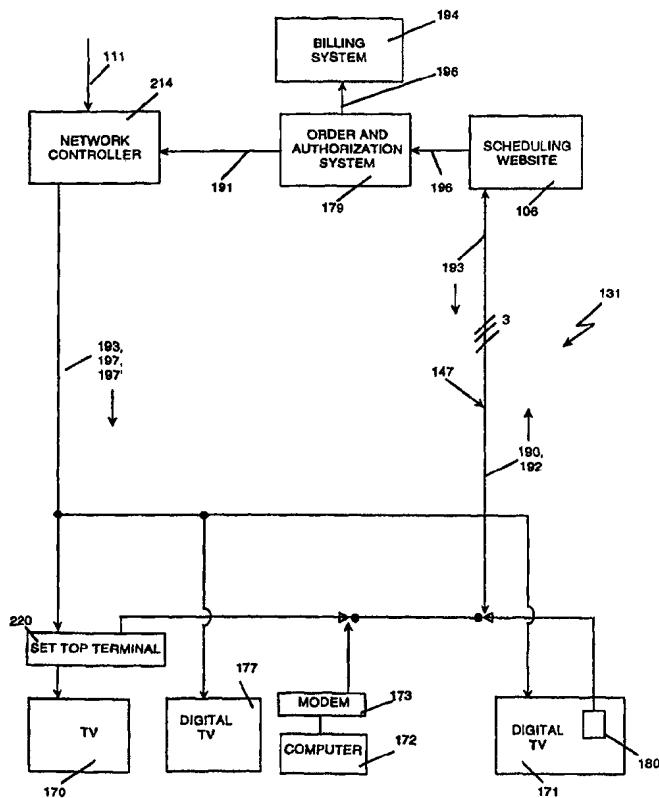
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(54) Title: DIGITAL BROADCAST PROGRAM ORDERING

(57) Abstract

A method and a system for selecting and ordering broadcast programs (197) uses an electronic program guide (310) that may be broadcast to subscribers or posted on an Internet web site (10). The system allows national broadcasters (110) to provide one or more channels of pay-per-view or subscription programming and to establish a mechanism for billing subscribers who access the programs. Subscribers may access the Internet (105) and send a program request to the web site (106). An authorization (196) is then forwarded to a billing center (194) and to a local broadcaster (114). The billing center (194) debits the subscriber's account, or prepares a bill. The local broadcaster (114) sends the authorization to the subscriber. The authorization (196) includes a program code and a terminal identifier (197) that permits the subscriber's television (170) or set top terminal (220) to decrypt and display the program (197).



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DIGITAL BROADCAST PROGRAM ORDERING

Related Applications

This application is a continuation-in-part of application Serial Number 08/711,742, filed September 10, 1996, entitled TELEVISION PROGRAM DELIVERY SYSTEM, which is a continuation of application Serial Number 08/160,191, filed December 2, 1993, entitled TELEVISION PROGRAM DELIVERY SYSTEM, now U.S. Patent No. 5, 559,549.

This application is also a continuation of application Serial Number 08/735,552, filed October 23, 1996, entitled NETWORK CONTROLLER FOR CABLE TELEVISION DELIVERY SYSTEMS, which is a continuation of application Serial Number 08/160,280, filed December 2, 1993, entitled NETWORK CONTROLLER FOR CABLE TELEVISION DELIVERY SYSTEMS, now U.S. Patent No. 5,600,364, which is a continuation-in-part of application Serial Number 07/991,074 filed December 9, 1992 entitled TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM WITH MENU DRIVEN SUBSCRIBER ACCESS.

This application is also a continuation of application Serial Number 08/352,205 filed December 2, 1994, entitled NETWORK MANAGER FOR CABLE TELEVISION SYSTEM HEADENDS, which is a continuation-in-part of application Serial Number 07/991,074, filed December 9, 1992, entitled TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM WITH MENU DRIVEN SUBSCRIBER ACCESS and application Serial Number 08/160,280, filed December 2, 1993, entitled NETWORK CONTROLLER FOR CABLE TELEVISION DELIVERY SYSTEMS, now U.S. Patent No. 5,600,364.

The following patents and continuation-in-part applications, also based on the above-referenced patent application, are incorporated herein by reference:

U.S. Patent No. 5,798,785, entitled REPROGRAMMABLE TERMINAL FOR SUGGESTING PROGRAMS OFFERED ON A TELEVISION PROGRAM DELIVERY SYSTEM.

U.S. Patent No. 5,659,350, entitled AN OPERATIONS CENTER FOR A
TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM, dated
August 19, 1997.

1 U.S. Patent No. 5,734,83, entitled SET-TOP TERMINAL FOR CABLE
2 TELEVISION DELIVERY SYSTEMS, dated March 31, 1998.

2 TELEVISION DELIVERY
3 Ser. No. 08/160,194, entitled ADVANCED SET-TOP TERMINAL FOR
4 CABLE TELEVISION DELIVERY SYSTEMS, filed December 2, 1993.

4 CABLE TELEVISION DELIVERY SYSTEM, dated October 28, 1997.
5 U.S. Patent No. 5,682,195, entitled DIGITAL CABLE HEADEND FOR
6 CABLE TELEVISION DELIVERY SYSTEM, dated October 28, 1997.

7 Background Of The Invention

The invention relates to television entertainment systems for providing television programming to consumer homes. More particularly, the invention relates to a method and an apparatus that allows subscribers to order broadcast digital television programming.

Advances in television entertainment have been primarily driven by breakthroughs in technology. In 1939, advances on Vladimir Zworykin's picture tube provided the stimulus for NBC to begin its first regular broadcasts. In 1975, advances in satellite technology provided consumers with increased programming to homes.

In addition to advances in television broadcast technology, government regulatory agencies have placed requirements on the broadcast television industry. In particular, the over-the-air broadcast television networks will soon transition to high definition television (HDTV) - a broadcast digital television standard. These broadcasters may elect to provide a single HDTV digital signal in their allotted bandwidth, with the remaining bandwidth used for standard definition television (SDTV) digital programming. While the broadcast networks may desire to structure some of these channels to include a subscription, or pay-per-view feature, no mechanism currently exists to allow the broadcast networks to control access to their future digital programming. Without an effective authorization and billing system, the broadcast networks will likely not implement pay-per-view programming, thereby reducing programming choices for consumers.

27 reducing programming . . .
28 The broadcast networks may also provide the same broadcast programming
29 over existing cable television and digital satellite television systems. As before, the

1 broadcast networks may want to control access to specific channels of their broadcast
2 programming.

3 The present invention solves these problems so that over-the-air broadcast
4 television services can be expanded to incorporate increased programming choices.

5 **Summary Of Invention**

6 This invention relates to a digital television program delivery system.
7 Specifically, the present invention is a digital television program delivery apparatus
8 and method that provides subscribers with access to multiple channels of digital
9 television programming including pay-per view events. The invention incorporates
10 advanced features such as menu-driven access and one-button program selection.

11 The invention makes use of developments in digital compression signaling
12 that allows much greater throughput of television program signals over existing
13 transmission media. These developments allow subscribers to use the invention to
14 exploit a four-fold or more increase in current program delivery capability. In
15 particular, the invention provides subscribers with a menu-driven access scheme to
16 an expanded television program lineup, enabling subscribers to access and view
17 selected programs using a user friendly interface.

18 This interface includes a remote control and a series of menus that may be
19 sequenced by the subscriber using simple alpha, numeric and iconic character access
20 keys, or by moving a cursor or highlight bar on the television screen. In this way, the
21 subscriber can advance from one menu to the next with the press of a single button.
22 Different television programs, grouped by category, for example, may be selected and
23 accessed from each menu. The menus also allow for ordering subscriptions to
24 speciality channels. Additionally, an interface is provided that allows for programs
25 to be selected for viewing using the Internet. As a result, the invention provides
26 subscribers with convenient methods of choosing a program for viewing from
27 hundreds of program offerings.

28 The invention may be used in at least two domains: delivery of the broadcast
29 digital multiplex signal via terrestrial, over-the-air media; and delivery of the
30 over-broadcast digital multimedia signal over an existing cable television system. Over-

1 the-air delivery includes standard television broadcasts. Cable delivery systems
2 include coaxial cable systems, fiber optic delivery systems, and telephone delivery
3 systems (including T1 and T3 lines, Integrated Services Digital Network (ISDN) lines
4 and Asymmetric Digital Subscriber Lines (ADSL)). In addition, programs may be
5 provided by direct satellite broadcast, by wireless broadcasts, and by other wired
6 means including local area networks.

7 To access the paid programming, an electronic program guide, program
8 authorization system and billing system are used to provide a menu of available
9 programming and to authorize receipt of programming and provide for payment by
10 subscribers.

11 The electronic program guide may be provided as part of the broadcast from
12 a national broadcaster. Alternately, the electronic program guide may be provided on
13 an Internet web site. The electronic program guide may list discrete programs, series
14 of programs, speciality channels, such as high definition television, and speciality
15 programs, such as sports packages. A subscriber indicates a desired program to order
16 by moving a cursor over the program, using a remote control, for example. The
17 subscriber then operates a go button on the remote control to send an order signal to
18 a remote location. Order signals may be sent to the national broadcaster, a broadcast
19 affiliate, a local cable system, any other broadcast program provider, another remote
20 location, and to the Internet web site.

21 In an embodiment, after receiving the order signal, an order and authorization
22 system verifies that the subscriber is authorized to view the selected program, and
23 sends an authorization signal to the broadcast program provider. The broadcast
24 program provider then provides a local authorization code that is addressed to the
25 terminal that originated the order signal. Alternately, the broadcast program provider
26 may provide the local authorization to a terminal different from the terminal that
27 initiated the program order. In this alternative, the address and identification number
28 of the terminal to receive the program must be provided by the terminal initiating the
29 program order. This alternative allows a subscriber to order a program from a
30 location other than his home, such as at a kiosk in a video rental store. This
31 alternative also allows the subscriber to provide access to a program, such as an

1 annual subscription to a speciality channel or a sports program package, to another
2 subscriber, for example as a gift.

3 The local authorization code may be multiplexed with the digital programs
4 being broadcast by the broadcast program provided. Alternately, the local
5 authorization code may be supplied by a separate location such as the Internet web
6 site.

7 These and other objects and advantages of the invention will become obvious
8 to those skilled in the art upon review of the following description, the attached
9 drawings and appended claims.

10 Brief Description Of Drawings

11 Figure 1 is a diagram of a digital television broadcast environment.

12 Figure 2 is a diagram of the primary components of a cable television delivery
13 system using the broadcast environment of Figure 1.

14 Figure 3 is a diagram of a terminal used in conjunction with the broadcast
15 environment of Figure 1.

16 Figures 4a - 4c are diagrams of remote location reception options.

17 Figure 5 is a diagram of an operations center of the television delivery system
18 of Figure 2.

19 Figures 6a-6c show embodiments of a local cable television delivery system.

20 Figure 7 shows a remote control for use in the broadcast environment of
21 Figure 1.

22 Figure 8 is an example of an electronic program guide for use with the
23 broadcast environment of Figure 1.

24 Figures 9a-9c are examples of order and authorizations systems for use in the
25 broadcast environment of Figure 1.

26 Figure 10 is an diagram of a digital television broadcast environment.

27 Figure 11 is an diagram of an alternate digital television broadcast
28 environment.

29 Figure 12 is an diagram of yet another example of a digital television
30 broadcast environment.

1 Figure 13 is a diagram of an authorization signal for use with the broadcast
2 environment of Figure 1.

3 Figure 14 is a diagram of a smart card.

4 Figures 15a-d show examples of an electronic program guide for use in the
5 broadcast program environment of Figure 1.

6 Figure 16 is a flow chart showing the operation of the broadcast environment
7 of Figure 11.

8 Figure 17 shows a menu structure for use with the television program delivery
9 system of Figure 2.

10 Figure 18a is a drawing of storage for on-screen menu templates and other
11 graphics files stored in graphics memory of the set top terminal.

12 Figure 18b is a drawing showing the hierarchical storage of text in memory
13 for the set top terminal.

14 Figure 18c is a drawing of a flow chart showing the steps required for the
15 microprocessor to retrieve, combine and display a menu.

16 Figure 19 is a block diagram of the hardware components of the set top
17 terminal.

18 Figure 20a is a perspective front view of a set top terminal.

19 Figure 20b is a perspective rear view of a set top terminal.

20 Figure 21 is a schematic of a card upgrade for a set top terminal.

21 Figure 22a is a drawing of a frame format for a program control information
22 signal.

23 Figure 22b is a drawing of a frame format for a polling response from the set
24 top terminal.

25 Disclosure Of Invention

26 A. Television Program Delivery System Description

27 1. Broadcast Television Environment

28 Figure 1 shows a broadcast television environment 100 in which a broadcast
29 program provider, such as a national broadcaster 110, provides digital multiplex
30 television programming 111 to a broadcast affiliate 112. The programming 111 may
31 be provided to the broadcast affiliate 112 by any suitable means. For example, the

1 national broadcaster 110 may provide the programming 111 by satellite transmission
2 using a satellite broadcast system 120. The satellite broadcast system 120 may include
3 an uplink site 121, a satellite 122, and a downlink site 123. The satellite broadcast
4 system 120 may transmit the programming 111 to the broadcast affiliate 112 and
5 directly to terminals 140, 141 and 142 at remote locations such as subscribers'
6 homes, for example.

7 The broadcast affiliate 112 may provide digital multiplex television
8 programming 115 to intermediate locations such as local cable system 114 and an
9 operations center 202. Alternately, the broadcast affiliates 112 may provide the
10 programming 115 directly to the terminals 140-142. The operations center 202 may
11 provide the programming 115 to the local cable system 114. The local cable system
12 114 that receives the programming 115 may in turn provide the programming 115 to
13 the terminals 140-142.

14 The terminals 140-142 may be any terminal capable of receiving digital
15 television signals including digital televisions, digital set top boxes and personal
16 computers, or any combination of these devices. The terminals 140-142 may receive
17 the programming 115 by cable, including coaxial cable and fiber optic cable, by
18 telephone cable (including T1 and T3 lines, Integrated Services Digital Network
19 (ISDN) lines and Asymmetric Digital Subscriber Lines (ADSL)), and by satellite
20 broadcast. Alternately, the terminals 140-142 may receive the programming 111
21 directly from the national broadcaster 110 via the satellite broadcast system 120. For
22 example, the terminal 142 receives direct broadcast satellite programming via a
23 backyard antenna 143.

24 Also coupled to the terminals 140-142 may be an Internet 105. The Internet
25 105 provides access to web sites such as web site 106. The web site 106 may supply
26 online services and data that may be displayed on a television (not shown) or a
27 personal computer (not shown), for example. The Internet 105 may also connect to
28 the broadcast affiliate 112 and the national broadcaster 110. The national broadcaster
29 110 may use the Internet 105 to post program menus and to provide a means for
30 authorizing reception of pay-per-view broadcast programming and to receive payment

1 for the programming. The use of the Internet 105 for these purposes will be described
2 later in more detail.

3 Figure 2 shows an expanded cable television program delivery system 200 that
4 dramatically increases programming capacity using compressed transmission of
5 television program signals and specifically incorporates the digital multiplex
6 programming 111 from the national broadcasters 110.

7 In addition to the programming 111, subscribers are able to access an
8 expanded television program package that includes other broadcast programming,
9 video on demand, interactive services, including online services, data services and
10 other programming. Subscribers view selected programs through a menu-driven
11 access scheme that allows each subscriber to select individual programs by
12 sequencing a series of menus. The menus may be sequenced by the subscriber using
13 simple alpha-numeric and iconic character access or moving a cursor or highlight bar
14 on the television display or the personal computer to access desired programs by
15 simply pressing a single button, rather than recalling from memory and pressing the
16 actual two or more digit numeric number assigned to a selection. Thus, with the press
17 of a single button, the subscriber can advance from one menu to the next, or can select
18 a program for viewing. In this fashion, the subscriber can sequence the menus and
19 select a program from any given menu. The programs may be grouped by category
20 so that similar program offerings are found on the same menu. Alternately, the
21 programs may be arranged in the menu in a matrix fashion by channel and time/date
22 of broadcast.

23 Subscribers are able to view the menu, or electronic program guide, of the
24 programming 115 in a variety of formats. The electronic program guide may be
25 broadcast by the national broadcaster 110 and displayed at the terminal 140.
26 Alternately, the electronic program guide may be provided at the web site 106.

27 Figure 3 shows the terminal 140 in more detail. The terminal 140 includes a
28 processor 161 that controls operation of components of the terminal 140. A display
29 162 displays the programming provided by the national broadcaster 110. The display
30 162 may be a CRT, a LCD, or any other device suitable for displaying digital
31 television signals. A memory 163 stores programming instructions, terminal

1 operating instructions, authorization signals, programming, including targeted
2 advertisements, programs watched data, and other information related to receiving
3 and watching broadcast programs. A communications interface 164 provides
4 communications with remote locations, such as the national broadcaster 110 and the
5 Internet 105 shown in Figure 1. The communications interface 164 may be a cable
6 modem, a telephone modem, a wireless modem, a fiber optic connector, a broadcast
7 satellite receiver, a radio frequency receiver, a LAN connector, or any other device
8 capable of one or two-way communication between the terminal 140 and the remote
9 location, or any combination of these devices. A receiver module 165 receives
10 broadcast programming from the national broadcaster 110. The receiver module 165
11 may include one or more receivers. Alternatively, the functions of the receiver
12 module 165 may be spread among other distributed equipment, such as a personal
13 computer or smart card, for example. A tuner 166, coupled to the receiver module
14 165, tunes to an appropriate channel to display a program provided by the national
15 broadcaster 110. If the program is a pay-per-view program, it may be encrypted. A
16 decrypter 167 decrypts such pay-per-view programs so that they may be displayed on
17 the display 162. A command input device 168 sends commands to the processor 161.
18 The command input device 168 may be a remote control or a data entry device
19 included in the terminal 140. The command input device 168 may also be a remote
20 device and a soft key board that is displayed on the display 162. A transmitter 169
21 transmits information, such as program order signals, via the communication interface
22 164 to the national broadcaster 110 or the Internet 105.

23 The terminal 140 also includes a demodulator 150, and a demultiplexer 159
24 to process the programming 115, a NTSC encoder to convert digital signals to NTSC
25 standard, and a video output to produce video for display on the display 162. Other
26 components required to provide television programming at the terminal 140 are
27 described later in more detail.

28 Some of the above features may be incorporated into the set top terminal 220,
29 or may be added to the set top terminal 220 by use of a plug-in card, such that
30 described in U.S. Patent 5,734,853, entitled SET TOP TERMINAL FOR CABLE
31 TELEVISION DELIVERY SYSTEMS and in copending application Serial No.

1 08/160,194, entitled ADVANCED SET TOP TERMINAL FOR CABLE
2 TELEVISION DELIVERY SYSTEMS, the disclosures of which are hereby
3 incorporated by reference.

4 The terminal 140 may be embodied as a digital television with the above-
5 described components built in. The terminal 140 may also be embodied as an analog
6 or digital television with an attached set top terminal. The terminal 140 may further
7 be embodied as a digital television that incorporates a smart card and that is coupled
8 to a personal computer. Finally, the terminal 140 may be a digital television that
9 incorporates a smart card alone. The terminal 140 may receive the programming
10 over-the-air from the national broadcaster 110 or the broadcast affiliate 112, via a
11 wired media such as by cable from the local cable system 114, and via the satellite
12 broadcast system 120.

13 2. In-Home Reception Options

14 Figures 4a, 4b and 4c show reception options at the remote locations such as
15 at a subscriber's home. In Figure 4a, a television 170 is coupled to a digital set top
16 terminal 220. The set top terminal 220 receives the programming 115 from the
17 broadcast affiliate 112 or the local cable system 114. The local cable system 114,
18 using the cable headend 208 or the operations center 202 shown in Figure 2, may
19 provide expanded television programming for display on the television 170.
20 Alternately, the broadcast affiliate 112 may provide the programming 115 by use of
21 the satellite broadcast system 120. In this alternative, the set top terminal 220 would
22 be coupled to a local, or backyard, satellite dish antenna or similar device. In yet
23 another alternative, the set top terminal 220 receives programming from both the
24 satellite broadcast system 120 and the local cable system 114.

25 Also shown in Figure 4a is a telephone 178 that may be used to communicate
26 with the broadcast affiliate 112 and the cable headend 208, and a personal computer
27 172 and a modem 173 that may be used to communicate with the Internet 105. The
28 personal computer 172 may be coupled to the set top terminal 220 via signal path 174.
29 The signal path 174 may include a cable connection such as a RS-232 cable and
30 connectors or by wireless means, such as infra red signaling and radio frequency
31 signaling, for example.

1 The set top terminal 220 performs the necessary processing to send the
2 programming 115 to the television 170 for display. For example, if the television 170
3 is an analog television, the set top terminal 220 may demultiplex the programming
4 115, convert the demultiplexed digital programming to a NTSC-compatible analog
5 signal and provide the analog signal to the television 170. If the television 170 is a
6 digital television, the set top terminal 220 may demultiplex the programming 115 and
7 supply the demultiplexed signal to the television 170.

8 The set top terminal 220 may receive commands from a remote control 900.
9 The remote control 900, which will be described in detail later, may be an infrared or
10 a radio frequency control, or any other suitable control. The set top terminal 220 may
11 include a variety of error detection, decryption, and coding techniques such as anti-
12 taping encoding. The set top terminal 220 may include communication devices that
13 allow reception and transfer of data with external sources such as the Internet 105.
14 For example, the set top terminal 220 may include a telephone modem, a cable
15 modem, a wireless modem, a fiber optic connector, a LAN connector, or any
16 combination of these devices.

17 The set top terminal 220 has input and output ports for communication with
18 other local and remote devices. For example, the set top terminal 220 may have an
19 input port that receives information from the cable headend 208. The set top terminal
20 220 may have output ports that provide communications from the set top terminal 220
21 to the television 170 and to a video cassette recorder (VCR) 175. Certain menu
22 selections may cause the set top terminal 220 to send control signals directly to the
23 VCR 175 to automatically program or operate the VCR 175. Also, the set top terminal
24 220 may contain a phone jack that can be used for maintenance, trouble
25 shooting, reprogramming and additional customer features. The phone jack may also
26 be used to connect the set top terminal 220 with the Internet 105. The set top terminal
27 220 may also contain stereo/audio output terminals and a satellite dish input port.

28 In an embodiment, the set top terminal 220 receives compressed program and
29 control signals from the cable headend 208, the operations center 202, the broadcast
30 affiliate 112, or the national broadcaster 110. After the set top terminal 220 receives
31 the individually compressed program and control signals, the signals are

1 demultiplexed, decompressed, converted to analog signals (if necessary) and either
2 placed in local storage (for later display or for other control functions, such as
3 creating programming menus), executed immediately, or sent directly to the television
4 screen.

5 After processing certain signals received from the cable headend 208, the set
6 top terminal 220 is able to store menu data for generating menus that are displayed
7 on a subscriber's television. Before a menu is generated, menu templates may be
8 created and sent to the set top terminal 220 for storage. A microprocessor in the set
9 top terminal 220 uses the control signals received from the operations center 202 or
10 cable headend 208 to generate the menu templates for storage. Each menu template
11 may be stored in volatile memory in the set top terminal 220. When the set top
12 terminal 220 receives the menu template information, the set top terminal 220
13 demultiplexes the program control signals received from the cable headend 208 into
14 four primary parts: video, graphics, program logic and text. Each menu template
15 represents a different portion of a whole menu, such as a menu background, a
16 television logo, a cursor highlight overlay, one or more scalable display windows, or
17 other miscellaneous components needed to build a menu. The menu templates may
18 be deleted or altered using control signals received from the operations center 202,
19 the cable headend 208, the broadcast affiliate 112 or the national broadcaster 110.

20 Once the menu templates have been stored in memory, the set top terminal
21 220 can generate the appropriate menus. In an embodiment, the basic menu format
22 information is stored in memory located within the set top terminal 220 so that the
23 microprocessor may locally access the information from the set top terminal 220
24 instead of from an incoming signal. The microprocessor next generates the
25 appropriate menus from the menu templates and the other menu information stored
26 in memory. The set top terminal 220 then displays specific menus on the subscriber's
27 television that correspond to the inputs the subscriber selects. Alternately, menu
28 viewing and program selection may use a web site on the Internet 105, which is
29 accessed via the provided modem interface.

30 If the subscriber selects a specific program from the menu, the set top terminal
31 220 determines on which channel the program is being shown, demultiplexes and

1 extracts the single channel transmitted from the cable headend 208. The set top
2 terminal 220 then decompresses the channel and, if necessary, converts the program
3 signal to an analog NTSC signal to enable the subscriber to view the selected
4 program. The set top terminal 220 can be equipped to decompress more than one
5 program signal. Two or more decompressors may be desirable to provide picture-on-
6 picture capability, control signal decompression, enhanced channel switching or like
7 features.

8 In addition to menu information, the set top terminal 220 may also store text
9 transmitted from the remote location such as the cable headend 208 or the operations
10 center 202. The text may inform the subscriber about upcoming events, billing and
11 account status, new subscriptions, or other relevant information. The text may be
12 stored in an appropriate memory location depending on the frequency and the
13 duration of the use of the textual message.

14 Optional upgrades are available to enhance the performance of the set top
15 terminal 220. These upgrades may include a cartridge or computer card (not shown)
16 that is inserted into an expansion slot in the set top terminal 220 or may include a
17 feature offered by the cable headend 208 or operations center 202 to which the user
18 may subscribe. Available upgrades may include online data base services, interactive
19 multi-media services, access to digital radio channels, and other services.

20 In an embodiment, available converter boxes such as those manufactured by
21 General Instruments or Scientific Atlanta, may be modified and upgraded to perform
22 the functions of the set top terminal 220.

23 Figure 4b shows an alternate arrangement of components for receiving the
24 broadcast digital programming 115. In Figure 4b, the digital television 171 is coupled
25 to the broadcast affiliate 112 to receive the programming 115. The digital television
26 171 may also receive the programming 115, and other programming, from the local
27 cable system 114 or from the satellite broadcast system 120.

28 The digital television 171 may include a smart card 180 that performs the
29 functions described above for the set top terminal 220. For example, the smart card
30 180 may include a cable modem, a telephone modem, a wireless modem, a fiber optic
31 connector, or a LAN connector. The smart card 180 is described later in more detail.

1 Also shown in Figure 4b is the personal computer 172 and the modem 173, which
2 function as before to connect to the Internet 105. The functions of the digital
3 television 171 may be controlled by the remote control 900, using either infrared
4 signals or radio frequency signals, for example.

5 Figure 4c shows another arrangement of components for receiving the
6 broadcast digital programming 115. In Figure 4c, a digital television 171' incorporating
7 the smart card 180 receives the programming 115 from the local cable system 114. The television 171' could also receive the programming via other media
8 including direct satellite broadcast, fiber optic connections, local area network, such
9 as an ethernet, the Plain Old Telephone Service (POTS), other telephone delivery
10 systems (including T1 and T3 lines, Integrated Services Digital Network (ISDN) lines
11 and Asymmetric Digital Subscriber Lines (ADSL)) and by over-the-air broadcast
12 from the broadcast affiliate 112. The television 171', incorporating the smart card
13 180, includes some or all of the functionality of the personal computer 172 shown in
14 Figure 4b, for example. The television 171' connects to the Internet 105 and is able
15 to access the web site 106 to view electronic program guides provided by the national
16 broadcaster 110, the broadcast affiliate 112 or the local cable system 114. The
17 television 171' is also able to access online services provided by the Internet 105, and
18 to perform computing functions normally associated with the personal computer 172.
19 The remote control 900 may be used to control the television 171'. The television
20 171' may also, in its programming, include a soft key board 174 that is displayed on
21 the display of the television 171'. The remote control 900 can then be used to operate
22 "soft keys" on the soft key board 174. The television 171' may also incorporate a
23 separate key board 174' that is used to control the television 171' and to operate the
24 television 171' in its personal computer role. The key board 174' may be connected
25 to the television 171' by a wired connection. Alternately, the key board 174' may
26 communicate with the television 171' by wireless means including infra red signaling,
27 radio frequency signaling and by other optical means including a laser. The television
28 171' may connect to other devices and media including the VCR 175 or other audio
29 or video recording device, and to a telephone system via signal path 154. The
30 television 171' may then be used to display information related to incoming telephone
31

1 calls, such as a caller identification number, for example. The television 171' may
2 also be used to support a video feed from a caller, such as in a video conference call.

3 **3. Other System Components**

4 Returning to Figure 2, the program delivery system 200 generally includes (i)
5 at least one operations center 202, where program packaging and control information
6 are created and then assembled in the form of digital data, (ii) a digital compression
7 system, where the digital data is compressed, combined/multiplexed, encoded, and
8 mapped into digital signals for satellite transmission to the cable headend 208 or the
9 broadcast affiliate 112, and (iii) a set of in-home terminals. The program delivery
10 system 200 transports the digital signals to the cable headend 208 where the signals
11 are transmitted through a concatenated cable television system 210 or to the broadcast
12 affiliate 112 where the programming 115 is sent to terminals, such as the terminal 141
13 of Figure 1, that are adapted to receive these signals. Within the cable headend 208,
14 the received signals may be decoded, demultiplexed, managed by a local central
15 distribution and switching mechanism, combined and then transmitted to the set top
16 terminal 220 located in each subscriber's home over the cable system 210. Although
17 concatenated cable systems 210 are the most prevalent transmission media for
18 connecting to the home, telephone lines (including T1 and T3 lines, Integrated
19 Services Digital Network (ISDN) lines and Asymmetric Digital Subscriber Lines
20 (ADSL)), cellular networks, fiber optics, local area networks, Personal
21 Communication Networks, and analog and digital satellites and similar technology
22 for transmitting to the home can be used interchangeably with the program delivery
23 system 200.

24 In the discussion that follows, the functions of the set top terminal 220 are
25 described. These same functions may also be carried out by the digital television 171
26 with the smart card 180, shown in Figure 4b, for example.

27 The program delivery system 200 has a reception region 207 with an in-home
28 decompression capability. This capability is performed by a decompressor housed
29 within the set top terminal 220. The decompressor remains transparent from the
30 subscriber's point of view and allows any of the compressed signals to be
31 demultiplexed and individually extracted from the composite data stream and then

1 individually decompressed upon selection by the subscriber. The decompressed
2 video signals may be converted into analog signals for television display. Such
3 analog signals include NTSC and PAL formatted signals for use by a standard
4 television. Control signals are likewise extracted and decompressed and then either
5 executed immediately or placed in local storage such as a random access memory
6 (RAM), a static random access memory (SRAM), a dynamic random access memory
7 (DRAM), or other memory. Multiple sets of decompression hardware may be used
8 to decompress video and control signals. The set top terminal 220 may then overlay
9 or combine different signals to form the desired display on the subscriber's television.
10 Graphics on video, picture-on-picture and split screen are examples of such a display.

11 Although a single digital compression standard (e.g., MPEG) may be used for
12 both the program delivery system 200 and the concatenated cable system 210, the
13 compression technique used may differ between the two systems. When the
14 compression standards differ between the two media, the signals received by the cable
15 headend 208 must be decompressed before transmission from the headend 208 to the
16 set top terminals 220. Subsequently, the cable headend 208 must recompress and
17 transmit the signals to the set top terminal 220, which would then decompress the
18 signals using a specific decompression algorithm.

19 The video signals and program control signals received by the set top terminal
20 220 correspond to specific television programs and menu data that each subscriber
21 may access through a subscriber interface. The subscriber interface is a device with
22 buttons, such as a key pad, located on the set top terminal 220 or the portable remote
23 control 900. In an embodiment, the subscriber interface is the combined alpha-
24 character, numeric and iconic remote control 900, which provides direct or menu-
25 driven program access. The remote control 900 also contains cursor movement and
26 go buttons as well as alpha, numeric and iconic buttons. The remote control 900,
27 used in conjunction with the menu arrangement, enables the subscriber to sequence
28 through menus by choosing from among several menu options that are displayed on
29 the television screen. In addition, the subscriber may bypass several menu screens
30 and immediately choose a program by selecting the appropriate alpha-character,
31 numeric or iconic combinations on the subscriber interface. In an embodiment, the

1 set top terminal 220 generates the menus that are displayed on the television using the
2 menu data and the menu templates, and the set top terminal 220 displays a specific
3 menu or submenu option for each available video signal. In another embodiment, the
4 menus are provided as a broadcast signal and are displayed on the television screen.
5 In yet another embodiment, the menus are provided at a remote location, such as the
6 web site 106 on the Internet 105, and subscribers may use the web site 106 for
7 program selection.

8 4. Operations Center and Digital Compression System

9 The operations center 202 performs two primary services, packaging
10 television programs and generating the program control information signal. At the
11 operations center 202, television programs are received from external program
12 sources in both analog and digital form. Figure 5 shows an embodiment of the
13 operations center receiving signals from various external sources 212. Examples of
14 the external program sources are sporting events, children's programs, specialty
15 channels, news or any other program source that can provide audio or visual signals.
16 Once the programs are received from the external program sources, the operations
17 center 202 digitizes (and preferably compresses) any program signals received in
18 analog form. The operations center 202 may also maintain an internal storage of
19 programs. The internally stored programs may be in analog or digital form and stored
20 on permanent or volatile memory sources, including magnetic tape or RAM or other
21 suitable storage medium. Subsequent to receiving programming, the operations
22 center 202 packages the programs into the groups and categories that provide the
23 optimal marketing of the programs to subscribers. For example, the operations center
24 202 may package the same programs into different categories and menus for weekday,
25 prime-time viewing and Saturday afternoon viewing. Also, the operations center 202
26 packages the television programs in a manner that enables both the various menus to
27 easily represent the programs and the subscribers to easily access the programs
28 through the menus.

29 The packaging of the digital signals may be performed at the operations center
30 202 by computer assisted packaging equipment (CAP). The CAP system normally
31 includes at least one computer monitor, keyboard, mouse, and standard video editing

1 equipment. A programmer packages the signals by entering certain information into
2 the CAP. This information includes the date, time slot, and program category of the
3 various programs. The programmer and the CAP may use demographic data and
4 ratings in performing the packaging tasks. After the programmer selects the various
5 programs from a pool of available programs and inputs the requisite information, the
6 programmer, with assistance from the CAP, can select the price and allocate
7 transponder space for the various programs. After the process is complete, the CAP
8 displays draft menus or program schedules that correspond to the entries of the
9 programmer. The CAP may also graphically display allocation of transponder space.
10 The programmer may edit the menus and transponder allocation several times until
11 satisfied with the programming schedule. During the editing, the programmer may
12 direct the exact location of any program name on a menu with simple commands to
13 the CAP.

14 The packaging process also accounts for any necessary groupings by satellite
15 transponder. The operations center 202 may send different groups of programs to
16 different cable headends 208 and/or set top terminals 220. One way the operations
17 center 202 may accomplish this task is to send different program packages to each
18 transponder. Each transponder, or set of transponders, then relays a specific program
19 package to specific cable headends 208 and/or set top terminals 220. The allocation
20 of transponder space is another important task performed by the operations center
21 202.

22 The operations center 202 may also "insert" directions for filling local
23 available program time in the packaged signal to enable local cable and television
24 companies to fill the program time with local advertising and/or local programming.
25 Consequently, the local cable headends 208 are not constrained to show only
26 programs transmitted from the operations center 202. New set top terminals may
27 incorporate both digital and analog channels. Therefore, the cable headend 208 may
28 combine analog signals with the digital signals prior to transmitting the program
29 signals to the set top terminals 220.

30 After packaging the programs, the CAP creates a program control information
31 signal to be delivered with the program package. The program control information

1 signal contains a description of the contents of the program package, commands to
2 be sent to the cable headend 208 and/or set top terminal 220, and other information
3 relevant to the signal transmission.

4 In addition to packaging the program control information signal, the
5 operations center 202 employs digital compression techniques to increase existing
6 satellite transponder capacity by a 4:1 ratio, or more, resulting in at least a four-fold
7 increase in program delivery capability. A number of digital compression algorithms
8 currently exist which can achieve the resultant increase in capacity and improved
9 signal quality desired for the system. The algorithms generally use one or more of
10 three basic digital compression techniques: (1) within-frame (intraframe)
11 compression, (2) frame-to-frame (interframe) compression, and (3) within carrier
12 compression. For example, the MPEG 2 compression method may be used. After
13 digital compression, the program signals are combined (multiplexed) and encoded.
14 The combined program signal is subsequently transmitted to various uplink sites 204.

15 There may be a single uplink site 204 or multiple uplink sites (represented by
16 204', shown in phantom in Figure 2) for each operation center 202. The uplink sites
17 204 may either be located in the same geographical place or may be located remotely
18 from the operations center 202. Once the combined program signal is transmitted to
19 the uplink sites 204, the signal may be multiplexed with other signals, modulated,
20 upconverted and amplified for transmission over satellite. Multiple cable headends
21 208 may receive such transmissions.

22 In addition to multiple uplinks 204, the delivery system 200 may also contain
23 multiple operations centers 202. One method for using multiple operations centers
24 202 is to designate one of the operations centers 202 as a master operations center and
25 to designate the remaining operations centers 202 as slave operations centers. In this
26 configuration, the master operations center coordinates various functions among the
27 slave operations centers such as synchronization of simultaneous transmissions and
28 distributes the operations workload efficiently.

29 5. Cable Headend

30 After the operations center 202 has compressed and encoded the program
31 signals and transmitted the combined program signals to the satellite, the cable

1 headend 208 receives and further processes the signals before they are relayed to each
2 set top terminal 220. Each cable headend site is generally equipped with multiple
3 satellite receiver dishes. Each dish is capable of handling multiple transponder
4 signals from a single satellite and sometimes from multiple satellites.

5 As an intermediary between the set top terminals 220 and the operations
6 center 202 (or other remote site), the cable headend 208 performs two primary
7 functions. First, the cable headend 208 acts as a distribution center, or signal
8 processor, by relaying the combined program signal to the set top terminal 220 in
9 each subscriber's home. In addition, the cable headend 208 acts as a network
10 controller 214 by receiving information from each set top terminal 220 and passing
11 such information on to an information gathering site such as the operations center
12 202.

13 Figure 6a shows an embodiment where the cable headend 208 and the subscriber's home are linked by certain communications media 216. In this particular embodiment, analog signals, digitally compressed signals, other digital signals and up-stream/interactivity signals are sent and received over the media 216. The cable headend 208 provides such signaling capabilities in its dual roles as a signal processor 209 and a network controller 214.

19 As a signal processor 209, the cable headend 208 prepares the program signals
20 that are received by the cable headend 208 for transmission to each set top terminal
21 220. In an embodiment, the signal processor 209 re-routes or demultiplexes and
22 recombines the signals and digital information received from the operations center
23 202 and allocates different portions of the signal to different frequency ranges. Cable
24 headends 208 which offer different subscribers different program offerings may
25 allocate the program signals from the operations center 202 in various manners to
26 accommodate different subscribers. The signal processor 209 may also incorporate
27 local programming and/or local advertisements into the program signal and forward
28 the revised program signal to the set top terminals 220. To accommodate this local
29 programming availability, the signal processor 209 must combine the local signal in
30 digital or analog form with the operations center program signals. If the local cable
31 system uses a compression standard that is different than the one used by the

1 operations center 202, the signal processor 209 must also decompress and recompress
2 incoming signals so they may be properly formatted for transmission to the set top
3 terminals 220. This process becomes less important as standards develop (i.e., MPEG
4 2). In addition, the signal processor 209 performs any necessary signal decryption
5 and/or encryption.

6 As a network controller 214, the cable headend 208 performs the system
7 control functions for the system. The primary function of the network controller 214
8 is to manage the configuration of the set top terminals 220 and process signals
9 received from the set top terminals 220. In an embodiment, the network controller
10 214 monitors, among other things, automatic poll-back responses from the set top
11 terminals 220 remotely located at each subscribers' home. The polling and automatic
12 report-back cycle occurs frequently enough to allow the network controller 214 to
13 maintain accurate account and billing information as well as monitor authorized
14 channel access. In this embodiment, information to be sent to the network controller
15 214 may be stored in RAM within each set top terminal 220 and will be retrieved only
16 upon polling by the network controller 214. Retrieval may, for example, occur on a
17 daily, weekly or monthly basis. The network controller 214 allows the television
18 program delivery system 200 to maintain complete information on all programs
19 watched using a particular set top terminal 220.

20 In addition to the above, the network controller 214 allows the television
21 program delivery system 200 to receive detailed information regarding operations at
22 each set top terminal 220. This information includes click-stream data such as
23 operation of channel select buttons, cursor buttons, volume adjust buttons, mute
24 buttons, and other buttons on the remote control 900, for example.

25 The network controller 214 is also able to respond to the immediate needs of
26 a set top terminal 220 by modifying the program control information signal received
27 from the operations center 202. Therefore, the network controller 214 enables the
28 television program delivery system 200 to adapt to the specific requirements of
29 individual set top terminals 220 when the requirements cannot be provided to the
30 operations center 202 in advance. In other words, the network controller 214 is able
31 to perform "on the fly programming" changes. With this capability, the network

1 controller 214 can handle sophisticated local programming needs such as, for
2 example, interactive television services, split screen video, and selection of different
3 foreign languages for the same video. In addition, the network controller 214 controls
4 and monitors all compressors and decompressors in the system.

5 The television program delivery system 200 and digital compression provide
6 a one-way path from the operations center 202 to the cable headend 208. Status and
7 billing information may sent from the set top terminal 220 to the network controller
8 214 at the cable headend 208 and not directly to the operations center 202. Thus,
9 program monitoring and selection control may take place only at the cable headend
10 208 by the local cable company and its decentralized network controllers 214 (i.e.,
11 decentralized relative to the operations center 202, which is central to the television
12 program delivery system 200). The local cable company will in turn be in
13 communication with the operations center 202 or a regional control center (not
14 shown) that accumulates return data from the set top terminal 220 for statistical or
15 billing purposes. In alternative system embodiments, the operations center 202 and
16 the statistical and billing sites are collocated. Further, telephone lines with modems
17 may be used to transfer information from the set top terminal 220 to the statistical and
18 billing sites. Alternately, the set top terminal 220 may incorporate a cable modem,
19 a wireless modem, connectors, LAN connectors, T1 and T3 connectors, Asymmetric
20 Digital Subscriber Line (ADSL) Connectors, Integrated Digital Service Network
21 (ISDN) connectors or other advanced communications interfaces for transmitting
22 information upstream to the cable headend 208, the operations center 202, a separate
23 statistical and billing site, an Internet 105 web site, and other remote locations.

24 In the above discussion, the cable headend 208 was used to provide
25 programming to the set top terminals 220. However, the national broadcaster 110
26 could choose to send the programming 111 directly to the terminal 142 of Figure 1
27 by satellite, for example. Optionally, the broadcast affiliate 112 could send the
28 programming 115 directly to the terminal 140 or to the terminal 141.

29 Figure 6b shows the cable headend 208 having a file server 215 capable of
30 storing digital compressed data. The cable headend components shown in Figure 2
31 include the network controller 214, the file server 215, signal reception equipment

1 234, an authorization component 236, and a set of channel modulators 238. The
2 network controller 214 performs many of its functions using its interface 232 with the
3 file server and its interface 268 with the authorization component 236 (which, in turn,
4 is connected to the file server 215 over a separate connection or interface 235). The
5 network controller 214 and other cable headend components all work with one
6 another to provide the capability to deliver programming in response to requests from
7 subscribers. The signal reception equipment 234 receives RF signals 222 (which may
8 include both analog or digital broadcast signals and digital programming and control
9 information signals), ATM data 226, and local feeds 224. The signal reception
10 equipment 234 may: (i) place various signals in storage in the file server 215 in
11 digitally compressed format, (ii) send certain signals to the channel modulators 238
12 for distribution over the cable distribution network 210' and/or (iii) send other signals
13 to the network controller 214 for processing.

14 In the embodiment shown in Figure 6b, the signal reception equipment
15 bypasses the file server 215, sending broadcast signals 239 over connection 240
16 directly to channel modulator 238 for distribution to subscribers. The signal reception
17 equipment 234 also transfers certain program control information and data to the
18 network controller 214 over a control link or connection 242. In this way, the
19 network controller 214 can receive the program control information signal from the
20 operations center 202 or some other remote source through the signal reception
21 equipment 234.

22 The authorization component 236 can receive requests for programs from the
23 set top terminals 220 either by telephone line 244 or upstream data transmissions 246
24 over the cable distribution network 210'. The authorization component 236 processes
25 the subscriber requests, prompting the file server 215 to spool the program requested
26 by the subscriber. Alternatively, the file server 215 may be instructed to transmit an
27 authorization code to the subscriber to enable descrambling or reception of a specific
28 program by the subscriber's set top terminal 220. The network controller 214
29 monitors all incoming requests to the authorization component 236 in order to
30 maintain up-to-date information on programs watched and viewing habits. By
31 monitoring and coordinating with the authorization component 236 and the file server

1 215, the network controller 214 oversees, and in some cases initiates, the selection,
2 spooling and transmission of programs, menus and advertisements to the subscribers
3 in the cable distribution network 210'. The network controller 214 may also receive
4 upstream data 246 directly.

5 Figure 6c shows a more detailed illustration of the cable headend 208
6 components with a file server 215 and network controller 214. As shown in the
7 figure, the headend includes signal reception equipment 234, an authorization
8 component 236, a file server 215, MPEG decoders 250, a buffer with frame repeat
9 252, channel modulators 238, and the network controller 214. The network controller
10 214 includes several components. These components include a receiver 254 or set
11 of receivers 254 (including a demodulator 254', demultiplexer 254" and/or buffering
12 circuitry 255), a work station 256, a program control information (PCI) signal
13 processing capability 258, a network management central processing unit (CPU) 260,
14 databases 262, control software 264 and an instruction memory 266 (which stores
15 computer program instructions that may be executed by the network management
16 CPU 260). These components are exemplary of the components that reside within
17 the network controller 214; however, other components, such as additional storage
18 (e.g., RAM, ROM, EPROM, and EEPROM), processors, work stations, receiver
19 equipment, signal processing devices, and additional software may also be included
20 in the network controller 214.

21 The network controller 214 uses such components in its coordination and
22 management of cable headend 208 operations. For example, the network
23 management CPU 260 is linked or connected to all other components in the network
24 controller 214. The network management CPU 260 also includes connections or
25 links, either directly or indirectly, with other cable headend 208 components.

26 As shown in Figure 6c, the network management CPU 260 is linked to the
27 authorization component 236 through a data and signal interface 268 (which may be
28 the same or an interface separate from the interface 235 shown in Figure 6c that
29 connects the authorization component 236 with the file server 215). The network
30 management CPU 260 also coordinates and manages file server 215 functions
31 through a separate interface 232. These interfaces between the network management

1 CPU 260, on the one hand, and the authorization component 236 and file server 215,
2 on the other hand, may be direct or indirect through one or more interfaces. Such
3 interfaces may be RS-232, RS-422, or IEEE-488 compatible. The network
4 management CPU 260 also monitors and, in some instances, instructs the channel
5 modulators 238 in regard to program distribution and signal processing activities over
6 a separate connection or interface 269.

7 Within the network controller 214, the network management CPU 260
8 includes a number of internal connections, links, or interfaces. Such links,
9 connections or interfaces include direct or indirect full duplex data and signal paths,
10 including a connection 270 to receiver 254, a connection 272 to work station 256, a
11 connection 274 to the PCI signal processing equipment 258, a connection 276 with
12 the data bases 262, a connection 278 with the instruction memory 266, a connection
13 280 with the control software 264, as well as other connections to additional internal
14 components as described herein. The network management CPU 260 uses these
15 links, connections, and interfaces to exchange data and program signals with other
16 network controller components and devices. Using such components and devices, the
17 network controller 214 performs its cable headend 208 operations.

18 The receiver 254 or set of receivers 254 is equipped to receive upstream data
19 transmissions 246 from the subscriber. This receiver 254 or receivers 254 may
20 simply be a telephone modem or more sophisticated control receiver equipment that
21 is adapted to receive upstream data transmissions 246 directly from the cable
22 distribution network 210, 210' (Figures 2 and 6b). The network management CPU
23 260 coordinates such reception by the receiver 254 or receivers 254.

24 The PCI signal processing equipment 258 is interfaced with the cable headend
25 208 signal reception equipment 234. The PCI signal processing equipment 258
26 enables the network controller 214 to receive the program control information signal
27 from the operations center 202 or another remote site through an interface 242 with
28 the signal reception equipment 234. The program control information signal is
29 received by the network controller 214 and processed by the network management
30 CPU 260 using the control software 264.

1 In some instances, the network management CPU 260 stores the data carried
2 by the program control information signal. This data includes data on program
3 packages and menu content and can be stored within the databases 262. The network
4 controller 214 can modify the program control information signal and transmit the
5 modified program control information signal to those set top terminals 220 in the
6 cable distribution network 210' that require the use of such data in order to generate
7 menus or perform other local processing capabilities.

8 The databases 262 include a variety of databases in which data from upstream
9 transmissions 246 from the subscribers can be stored. The databases 262 may also
10 store information and data on program packaging, menu content, advertisements and
11 billing. No set number of databases 262 are required for the network controller 214
12 to perform its operations, and a single temporary database may be used. In an
13 embodiment, however, the network controller 214 uses several databases 262 that
14 are accessed 278 during network management operations.

15 The network management CPU 260 also acts with the instruction memory 266
16 as needed in order to run certain control and network management software 264.
17 Such software may be stored in the instruction memory 266 or in one or more other
18 storage locations within the network controller 214.

19 By maintaining links with the authorization component 236 and the file server
20 215, the network controller 214 is flexible enough to maintain up-to-date programs
21 watched information. Such programs watched information can be based on upstream
22 data transmissions 246 that are received over the cable distribution network 210, 210'
23 or through a telephone line 244. The network controller's 214 connection 232 with
24 the file server 215 allows the network controller 214 to coordinate and manage
25 intelligent selection and spooling of programs, menus and advertisements stored in
26 the file server 215. Alternatively, the software resident within the network controller
27 214 may reside within the file server 215 itself or certain functions may be split
28 between the two cable headend components.

29 6. Remote Control Device

30 The primary conduit for communication between the subscriber and the set
31 top terminal 220 is through the subscriber interface, such as the remote control 900

1 shown in Figure 7. Through the remote control 900, the subscriber may select desired
2 programming through the television program delivery system's menu-driven scheme
3 or by directly accessing a specific channel by entering the actual channel number.
4 Using the remote control 900, the subscriber can navigate through a series of
5 informative program selection menus. By using menu-driven, iconic or alpha-
6 character access, the subscriber can access desired programs by simply pressing a
7 single button rather than recalling from memory and pressing the actual channel
8 number to make a selection. The subscriber can access regular broadcast and basic
9 cable television stations by using either the numeric keys on the remote control 900
10 (pressing the corresponding channel number), or one of the menu icon selection
11 options.

12 In addition to enabling the subscriber to easily interact with the television
13 program delivery system 200, the physical characteristics of the subscriber interface
14 900 also adds to the user friendliness of the system. The remote control 900 easily
15 fits in the palm of the subscriber's hand. The buttons of the preferred remote control
16 900 may contain pictorial symbols that are easily identifiable by the subscriber. Also,
17 buttons that perform similar functions may be color coordinated and consist of
18 distinguishing textures to increase the user friendliness of the system.

19 The remote control 900 may communicate with the set top terminal through
20 wireless means such as infra red signals and radio frequency signals. In addition, the
21 remote control 900 may communicate with the set top terminal by wired connections,
22 and by other wireless means including laser-based optical signals that scatter the laser
23 light at its source, microwave signals and masers. Laser links could be accompanied
24 by a bidirectional radio frequency link to do automatic feedback control of the laser's
25 pointing direction, with the laser slaved very tightly to the middle of the transmission
26 beam width of the command interface in the set top terminal 220.

27 In the configurations shown in Figures 4a and 4b, the remote control 900 may
28 be used to operate the set top terminal 220, the televisions 170 and 171 and the VCR
29 175. The remote control 900 may also be used to operate the PC 172 of Figures 4a
30 and 4b. If the remote control 900 is not used to operate the PC 172 of Figures 4a and

1 4b, the PC 172 may be operated by an attached keyboard (not shown) or some other
2 suitable subscriber interface.

3 In addition to the remote control 900, the televisions 170, 171 and 177 of
4 Figures 4a and 4b, the VCR 175 and the PC 172 may be operated by voice
5 communications. For example, the PC 172 and the set top terminal 220 may be
6 trained to recognize and respond to the voice of the subscriber.

7 B. Broadcast Program Ordering System

8 The selection of a program from the programming 115 or the programming
9 111 begins with the subscriber viewing a menu of program choices. Figure 8 shows
10 an example of an electronic program guide 300 that is related to the programming
11 115. The program guide 300 could also be used to provide menu choice for
12 programming provided directly by the national broadcaster 110 (i.e., programming
13 111 shown in Figure 1). As will be described later, the program guide 300 may also
14 be incorporated into a menu-driven program access system provided by the cable
15 headend 208 or the operations center 202 of Figure 2. Alternately, the program guide
16 300 may be sent to the set top terminal 220 over a dedicated channel, may be
17 incorporated into other program signals, and may be provided at a remote location
18 such as the web site 106 on the Internet 105.

19 Referring to Figure 8, the available programs are listed by title in a continuous
20 time barker channel format. The program guide 300 lists the available programs in
21 a matrix by time and channel. Thus, as shown in Figure 8, eight channels are
22 available. Channel 1 is a free channel carrying HDTV programming. Channels 2
23 through 6 are pay-per-view channels carrying other standard definition digital
24 programming. Channels 7 and 8 are free channels and carry additional programming.

25 Each program in the program guide 300 could be identified by an event
26 number that designates the time/date of broadcast, and by a program identifier, that
27 uniquely identifies the program. The event data and the program identifier can be
28 included in an authorization signal, or local authorization code, that is sent to the
29 terminal 140. Alternately, the program identifier could be sent to the terminal 140,
30 with an event number that allows the terminal 140 to access the selected program any

1 time it was broadcast. In this arrangement, the terminal 140 may be manually tuned
2 to the channel carrying the selected program.

3 The number of channels carrying standard definition digital programming can
4 vary, depending on the total bandwidth allocated to the national broadcaster 110. In
5 addition, if HDTV programming is not provided, for example during off-peak hours
6 from midnight to 6 a.m., additional channels may be available for SDTV digital
7 programs. The program guide 300 will change to accommodate the number of digital
8 channels available.

9 The program guide 300 may be used to directly order desired programming.
10 The desired program may be selected by using cursor keys on the remote control 900
11 to navigate the program guide 300 and to highlight programs listed in the program
12 guide 300. When the desired program is highlighted, the go button of the remote
13 control 300 may be operated to provide one-button ordering. That is, operation of the
14 go button will send the order signal to the national broadcaster 110, for example.

15 The program guide 300 shown in Figure 8 includes a list of programs,
16 available start times, costs to order and ratings. Other information may be included
17 in the program guide 300. For example, for hit movies, the program guide 300 may
18 include a brief description of the movie, its year of release, and the names of its major
19 stars.

20 Other program guide configurations are also available. The program guide
21 300 could be provided in a hard copy format. In this embodiment, the program guide
22 300 could include alpha-numeric information that a subscriber would use to order a
23 particular program. For example, a movie could be identified by an event number,
24 that is the time and date of broadcast, and the duration of the broadcast, and by a
25 program identifier that is unique to the movie. The event number and the program
26 identifier could be included in the hard copy of the program guide 300. Other method
27 for identifying a program or a series of programs are described in U.S. Patent
28 5,659,350 entitled OPERATIONS CENTER FOR A TELEVISION PROGRAM
29 PACKAGING AND DELIVERY SYSTEM, which is hereby incorporated by
30 reference. To order a program, the subscriber could enter the event number and the
31 program identifier into the terminal 140, using the remote control 900, for example.

1 By then pressing the go button on the remote control 900, the subscriber would be
2 sending a program order. Alternately, the subscriber could call an order and
3 authorization system and provide the event number and program identifier, or other
4 descriptive information, over the telephone. The subscribers may also order a
5 program by accessing an Internet web site, either from the set top terminal 220 or the
6 PC 172 of Figure 4a, for example. The order and authorization system would then
7 issue an authorization signal. A corresponding local authorization code may be
8 provided with the programming 115 or via the Internet web site.

9 The program guide 300 may include submenus and other features, which will
10 be described later with respect to the menu-driven access system.

11 For real-time ordering and authorization, when the desired program is
12 highlighted, the subscriber orders the program by operating a go, or select, button, on
13 the remote control 900. Operation of the go button begins the process of program
14 reception, program authorization and program payment. Specifically, operation of the
15 go button sends the order signal to a remote location. In response, an authorization
16 signal may be provided by the remote location that received the order signal, or
17 another remote location. The authorization signal includes the code required to
18 decrypt and display the selected program on the television 171 of Figure 4b, for
19 example.

20 Ordering and authorization may also be conducted in a non-real-time basis.
21 For example, the local cable system 114 or the broadcast affiliate 112 may conduct
22 periodic polling over the cable system or the plain old telephone system (POTS) to
23 determine recent selections. Programs selected by the subscriber would then be
24 registered with the local cable system 114 or the broadcast affiliate 112 and a bill
25 would be prepared reflecting the cost to the subscriber for accessing these programs.
26 Alternately, the set top terminal 220 or the television 171 may incorporate a smart
27 card/cash card with a pre-paid limit, where a quantity of purchases are pre-authorized.
28 In another alternative, the programs are paid for after the fact upon the cash card
29 being returned to an authorization and billing facility or billing agent.

30 The program guide 300 may be used to display program suggestions for
31 discrete programs and events. The program guide may also be used to display

1 multiple part programs, such as a television mini-series and subscriptions services.
2 Subscription services could include speciality channels and speciality programs. The
3 speciality channels could include a first-run movie channel, for example. The
4 speciality programs could include sporting events, for example. A subscription to the
5 sporting events could be on a favorite team basis, a full season basis, or a partial
6 season basis, for example.

7 The program guide 300 of Figure 8 may be displayed for viewing by the
8 subscriber in a variety of telecommunications media. For example, the program guide
9 300 may be provided as an electronic program guide (EPG) and carried on a
10 television channel. The program guide 300 would then be displayed on the television
11 171. Alternately, the program guide 300 may be provided on a web site 106 of the
12 Internet 105. In this alternative, the program guide 300 could be displayed on the
13 personal computer 172 or the television 171 of Figure 4b. Additional details of the
14 electronic program guide for use with the broadcast environment of Figure 1 are
15 provided later.

16 The electronic program guide could also be provided as an individualized
17 program guide that is tailored to a specific subscriber or group of subscribers. That
18 is, the individualized program guide could present a menu of favorite programs,
19 where the menu of favorite programs is developed based on information gathered
20 about the specific subscriber. The information could include subscriber-entered data
21 that is provided by the subscriber to a series of questions presented at the terminal
22 140, for example. The series of questions may be presented when the specific
23 subscriber initially accesses the broadcast environment, periodically thereafter, and
24 at other times when desired by the specific subscriber. Gathering programs watched
25 data is described in detail in copending application Serial No. 09/124,043 entitled
26 METHOD AND APPARATUS FOR USING PROGRAMS WATCHED DATA,
27 filed July 19, 1998, which is hereby incorporated by reference.

28 The programs watched data may be gathered by, or transferred to a processor
29 in a remote location, such as the cable headend 208 and the broadcast affiliate 112,
30 for example. The programs watched data may also be gathered by the set top terminal
31 220 and then may be transferred to the processor in the remote location. The

1 processor may also receive the demographic data, and the other subscriber specific
2 data.

3 Individualized menus may be provided by the cable headend 208 or the
4 national affiliate 112, with the menu data included in the programming 115, for
5 example. Alternately, the menu data may be provided by out of band signaling.

6 When the electronic program guide is provided on the Internet web site, the
7 Internet web site may recognize the subscriber, based on the subscriber's automatic
8 number identification (ANI), user name, user identification, and Internet address (i.e.,
9 REMOTE_HOST, REMOTE_ADDR, and HTTP_NAME), for example. The
10 subscriber may also be identified by a unique subscriber identifier that is provided to
11 the subscriber upon subscribing to a broadcast television service. Other means for
12 identifying a subscriber include special features such as browser cookies. A browser
13 cookie is a mechanism that allows a web site server to store limited amounts of
14 information on a browser. The information is typically information sent to a
15 subscriber's terminal using a Set-cookie HTTP response field header. The Set-cookie
16 field contains the cookie content as a name/value pair, and can also contain
17 information explaining when the cookie will no longer be valid (expires), the Internet
18 domain for which the cookie is valid (domain), and the path portion of the URL
19 within this domain for which the cookie is valid. Browsers that understand cookies
20 will store the data on the terminal's hard disk, for example, and will return these data
21 to the web site server from which the cookie originated within a cookie request header
22 field. Cookies are useful for storing state information (when the subscriber last visited
23 the web site, which resources the subscriber last used, for example) on the browser,
24 in such a way that the information is not lost when the subscriber leaves the web site
25 or shuts down the browser.

26 A web site, such as the web site 106, may use cookies to customize program
27 ordering for a subscriber. For example, the web site 106 may welcome a subscriber
28 to the web site 106, based on the information in the cookie, and may navigate the
29 subscriber to a preferred menu, or individualized program guide, based on previous
30 program orders provided by the subscriber.

1 When the subscriber is identified, the web site 106 may create the
2 individualized program guide, which the specific subscriber may download to the
3 terminal 140 (i.e., down load to the PC 172, the televisions 171 and 177 and the set
4 top terminal 220).

5 Alternately, the subscriber may log on to the Internet web site, using the PC
6 172 or the television 171' of Figures 4a-4c. The subscriber may then enter a
7 subscriber identification. The Internet web site will then present the individualized
8 menu to the subscriber, who may view the individualized menu on the television 171',
9 for example. The individualized web site may be based on subscriber specific data,
10 such as programs watched data, for example. The subscriber specific data may be
11 stored in the set top terminal 220, for example, until a polling request message is sent
12 to the set top terminal 220, for example.

13 In the situations described above, the specific subscriber may also view a
14 generic program guide, such as the program guide 300, by use of the remote control
15 900 or the PC 172 to enter a command to switch program guides. The specific
16 subscriber may also view the individualized program guide, and select programs
17 therefrom, by switching from the generic program guide to the individualized
18 program guide.

19 The preceding discussion is based on the assumption that a subscriber initiates
20 a program order from the subscriber's own terminal 140. However, the invention is
21 not limited to this configuration. Alternately, the broadcast program provider may
22 provide the local authorization code to a terminal different from the terminal that
23 initiated the program order. In this alternative, an address and identification number
24 of the terminal to receive the program, or some other means for identifying the
25 terminal, such as the name and address of the individual to receive the program, must
26 be provided by the terminal initiating the program order. This alternative allows the
27 subscriber to order a program from a location other than his home, such as at a kiosk
28 in a video rental store. This alternative also allows the subscriber to provide access
29 to a program, such as an annual subscription to a speciality channel or a sports
30 program package, to another subscriber, for example as a gift.

1 Figures 9a - 9c show alternate arrangements of an order and authorization
2 system 179 that can be used with the programming 111 or 115. In the discussion that
3 follows, the subscriber receives the programming 115 from the local cable system
4 114. However, the order and authorization system 179 may also be used when the
5 programming 115 is provided by the broadcast affiliate 112 or the satellite broadcast
6 system 120, or any other entity capable of providing digital broadcast programs.

7 In Figures 9a - 9c, program order signals and program authorization signals
8 may be provided over a variety of telecommunications media including via a cable
9 modem to the local cable system 114; over a proprietary two-way transmission system
10 to the local cable system 114; over a fiber optic cable system to the local cable system
11 114, the broadcast affiliate 112 or the national broadcaster 110; via a telephone
12 modem with any of the local cable system 114, the broadcast affiliate 112 and the
13 national broadcaster 110, using existing telephone lines; via a cellular modem over
14 wireless telecommunication systems; via T1 and T3 lines, Asymmetric Digital
15 Subscriber Lines, Integrated Digital Services Network lines, and via a telephone and
16 the plain old telephone system (POTS). Alternately, the broadcast programs and the
17 order and authorization signals may also be provided over a LAN such as an ethernet.
18 In addition either the order signals and the authorization signals may be provided over
19 the satellite broadcast system 120. An alternate arrangement for one-way
20 authorization control is to embed the authorization signal in the programming 115 or
21 the programming 111.

22 In Figure 9a, the national broadcaster 110 provides the programming 111 to
23 the broadcast affiliate 112. The broadcast affiliate 112 sends the programming 115
24 to the local cable system 114. The local cable system 114 sends the programming 115
25 to the terminal 140. To decrypt and display a program from the programming at the
26 terminal 140, the subscriber must initiate the order signal. In the embodiment shown
27 in Figure 9a, the subscriber sends an order signal 190 to the local cable system 114.
28 Upon receipt of the order signal 190, the local cable system 114 sends an
29 authorization signal 191 to the terminal 140. The authorization signal 191 includes
30 a code that allows the terminal 140 to decrypt the program ordered with the order
31 signal 190.

1 Figure 9b shows an alternate arrangement of the order and authorization
2 system 179. The order and authorization system 179 shown in Figure 9b differs from
3 that shown in Figure 9a in that an order signal 190' is sent to the broadcast affiliate
4 112, and in return, an authorization signal 193 is returned to the terminal 140.

5 Figure 9c shows yet another arrangement of the order and authorization
6 system 179. In Figure 9c, an order signal 190" is sent to the national broadcaster 110.
7 The national broadcaster 110 then returns an authorization signal 195 to the terminal
8 140.

9 The arrangements of the order and authorization system 179 of Figures 9a -
10 9c show the authorization signal being sent by the same entity (e.g., the broadcast
11 affiliate in Figure 9b) that received the order signal. The order and authorization
12 system 179 is not limited to this configuration. For example, the order signal could
13 be sent to the local cable system 114. The local cable system 114 could then relay the
14 order signal to either the broadcast affiliate 112 or the national broadcaster 110. The
15 broadcast affiliate 112 or the national broadcaster 110, respectively, could then send
16 the authorization signal to the terminal 140. In yet another arrangement, the national
17 broadcaster 110 or the broadcast affiliate 112 could relay the authorization signal to
18 the local cable system 114. The local cable system 114 would then send the
19 authorization signal to the terminal 140.

20 In another example, although Figure 9a shows the order signal 190 being
21 transmitted to the local cable system 114, the order signal 190 could also be
22 transmitted to another remote location maintained by the local cable system 114, or
23 maintained on behalf of the local cable system 114. For example, the order signal 190
24 could be transmitted to the web site 106 of the Internet 105. The local cable system
25 114 could maintain the web site 106. Alternately, the national broadcaster 110, the
26 broadcast affiliate 112, or some other entity, such as an online television guide
27 service, could maintain the web site 106.

28 In yet another alternative, a first terminal 140 could access the program guide
29 300 and transmit an order signal 190, but designate the ordered program for display
30 on a second terminal 140. In this alternative, address and identification information
31 for the second terminal 140 would be provided with the order signal 190.

1 In still another embodiment, the order and authorization system 179 may
2 provide local authorization codes for two or more programs that air at the same time.
3 In this alternative, the terminal 140 may display the programs in a split screen or
4 picture-in-picture format, may cycle between the two or more programs, may delay
5 display of a program until a later showing is provided, may save one or more
6 programs in memory for later replay, may direct an attached VCR or other video
7 recording device to record one program while another is displayed, may display a first
8 program on a first television and a second program on a second television, or any
9 combination of the above features. For example, a terminal 140 could be authorized
10 to view a package of live football games airing simultaneously. The terminal 140
11 could then cycle between games, or record one game and display a second game, for
12 example. In order to accommodate these features, the terminal 140 may be provided
13 with two or more tuners and associated processing components such as
14 decompressors, demultiplexers and decrypters.

15 Figures 10, 11 and 12 show broadcast digital television environments that
16 allow subscribers with different television reception capabilities to order and receive
17 broadcast digital programming on a pay-per-view or subscription basis. Also shown
18 in Figures 10-12 are terminals such as the terminal 140 of Figure 1. The terminals
19 may have different capabilities. For example, one terminal could include an analog
20 television 170 and a digital set top terminal 220 while another terminal 140 may
21 include the digital television 171 equipped with the smart card 171.

22 In the discussion that follows, the terminal 140 is used to refer generically to
23 the different combinations of components. In Figures 10, 11 and 12, the
24 programming is shown being supplied by a local cable system. However, as
25 discussed above, the programming, and associated ordering, authorization and billing
26 signals could also be provided by other telecommunications media including by
27 satellite broadcast, over-the-air broadcast, wireless broadcast, fiber optic broadcast,
28 T1 and T3 lines, ADSL and ISDN lines, and broadcast over POTS, individually and
29 in combination.

30 Figure 10 shows a broadcast digital television environment 121 in which the
31 network controller 214 of a local cable system 114 provides digital broadcast

1 programming to subscribers. The network controller 214, as the controller of the
2 local cable system 114, receives the programming 115 from the broadcast affiliate
3 112, or directly from the national broadcaster 110. The network controller 214
4 provides programming 197, which may include a local authorization code 197', to
5 subscribers of the local cable system 114. The programming 197 may be multiplexed
6 and compressed. The local authorization code 197', which may also be multiplexed
7 and compressed, is provided in response to an order placed by the subscriber, and is
8 formatted such that it can be interpreted only by the terminal to which it is addressed.
9 That is, the local authorization code 197' includes an address corresponding to the
10 terminal that ordered the program. The address may be built into the circuitry of the
11 terminal 140, or may be provided by the local cable system 114, for example.

12 The network controller 214 also supplies a program guide signal 198, which
13 includes data related to available programs. The program guide signal 198 may also
14 include instructions for formatting the data, such as a menu template. The program
15 guide signal 198 is interpreted by the terminal 140 receiving it and is used to produce
16 the program guide 300 shown in Figure 8, for example. The program guide 300 may
17 include additional submenus, such as notification submenus, escape submenus, and
18 description submenus. The submenus are described in detail later.

19 Subscribers to the local cable system 114 may receive the programming 197
20 and the program guide signal 198 in components that have different reception
21 capabilities. In Figure 10, the set top terminal 220 receives the programming 197 and
22 the program guide signal 198. The program guide signal 198 may be stored in a
23 memory (not shown in Figure 10) of the set top terminal 220. Alternately, the
24 program guide signal 198 may be provided on a real-time basis. Upon receiving a
25 command to display the program guide 300, the set top terminal 220 formats the
26 program guide signal 198 into a readable format such as that shown in Figure 8, and
27 the television 170 displays the program guide 300. The set top terminal 220 may
28 demultiplex, decompress, and decrypt the program guide signal 198. The television
29 170 may be a digital television or an analog television. If an analog television, the set
30 top terminal 220 converts the digital data to a NTSC-compatible analog signal for
31 display.

1 The set top terminal 220 receives program selections from the subscriber (e.g.,
2 by the subscriber operating the go button on the remote control 900). The set top
3 terminal 220 then produces the order signal 190 to order the selected program. The
4 order signal 190 may be provided over a cable television cable using a cable modem,
5 a LAN, the POTS using a telephone modem, ADSL and ISDN, a fiber optic cable,
6 and by wireless means using a wireless modem.

7 Also shown in Figure 10 is a digital television 171 that incorporates a smart
8 card 180. The smart card 180 receives the program guide signal 198, and produces
9 the program guide 300 for display on the television 171. The television 171 receives
10 the programming 197 with the local authorization code 197', as appropriate. The
11 smart card 180 receives program selections from the subscriber (e.g., by the
12 subscriber operating the go button on the remote control 900). The smart card 180
13 then produces the order signal 190 to order the selected program.

14 The order and authorization system 179, which may be located at the local
15 cable system 114, a central billing location, or some other remote location including
16 a web site on the Internet 105, receives the order signals 190 from the set top terminal
17 220 and the smart card 180. The order and authorization system 179 then prepares
18 the authorization signal 191 and sends the authorization signal 191 to the network
19 controller 214. On receipt of the authorization signal 191, the network controller 214
20 generates the local authorization code 197' that is addressed to the terminal from
21 which the order signal originated, and multiplexes the local authorization code 197'
22 into the programming 197.

23 The order and authorization system 179 also sends the authorization signal
24 191 to a billing system 194. The billing system 194, on receipt of the authorization
25 signal 191, prepares a billing record that may be sent to the subscriber on a periodic
26 basis. The billing record may also be used to debit a subscriber's account with the
27 local cable system 114, to debit a subscriber's checking account, or to charge to a
28 subscriber's credit card, for example. If the program guide 300 incorporates an
29 escape submenu (to be described later), the billing record may not be generated by the
30 billing system 194 until a set time after the start of the program. This feature allows
31 the subscriber to cancel viewing of a program without incurring a fee, provided that

1 a cancellation signal is received within the set time period, for example, five minutes.
2 The subscriber can initiate the cancellation signal by accessing a hidden menu that
3 incorporates this feature, for example. Alternately, the subscriber can cancel the order
4 by manually tuning away from the channel displaying the selected program.

5 Figure 11 shows a broadcast digital television environment 131 in which the
6 network controller 214 of the local cable system 114 provides digital broadcast
7 programming to subscribers. The network controller 214, as the controller of the
8 local cable system 114, receives the programming 115 from the broadcast affiliate
9 112, or the programming 111 directly from the national broadcaster 110. The
10 network controller 214 provides the programming 197, which may include the local
11 authorization code 197', to subscribers of the local cable system 114. The local
12 authorization code 197' is provided in response to an order placed by the subscriber,
13 and is formatted such that it can be interpreted only by the terminal to which it is
14 addressed. That is, the local authorization code 197' includes an address
15 corresponding to the terminal that ordered the program. The address may be built into
16 the circuitry of the terminal, or may be provided by the local cable system 114, for
17 example.

18 The programming 197 may be received by subscribers having terminals with
19 different reception capabilities. The set top terminal 220 receives the programming
20 197 and may provide programs for display on the television 170. The television 170
21 may be a digital or an analog television. If an analog television, the set top terminal
22 220 converts the digital programs provided by the programming 197 into NTSC-
23 compatible analog signals.

24 The digital television 177 also receives the programming 197. The digital
25 television 177 displays those programs for which the local authorization code 197' is
26 provided.

27 The digital television 171 equipped with the smart card 180 also receives the
28 programming 197. The digital television 171 displays those programs for which the
29 local authorization code 197' is provided.

30 As described above, the reception of the programming 197 is the same
31 between the environment 121 shown in Figure 10 and the environment 131 shown in

1 Figure 11. However, the reception of the program guide data and program ordering
2 differ. In the environment 131, the subscribers view the national broadcaster's
3 program selections by accessing the web site 106 on the Internet 105. That is, the
4 national broadcaster 110 may create the web site 106, and provide the web site 106
5 with the program guide 300. The subscribers make program selections directly from
6 the web site 106.

7 Referring to Figure 11, the set top terminal 220 is shown coupled to the web
8 site 106 over the signal path 147. The signal path 147 may be a coaxial cable or a
9 telephone line, for example. The set top terminal 220 may be coupled to the web site
10 106 by a cable modem, a telephone modem, T1 and T3 lines, Integrated Services
11 Digital Network (ISDN) lines and Asymmetric Digital Subscriber Lines (ADSL), a
12 wireless modem or a fiber optic connector, for example. The display of the television
13 170 may be used as the display for viewing the web site 106. The remote control 900
14 may be used for sending commands to the set top terminal 220, which are then
15 relayed to the web site 106 for selecting and ordering programs from the program
16 guide 300. The web site 106 may also incorporate features such as a soft key board
17 to increase its functionality.

18 Those skilled in the art will recognize many ways to access the web site 106.
19 For example, the television 170 may display a web browser page that includes a
20 location field. The web address may then be entered into the location field, using the
21 remote control 900 or the key pad 221, and the go button of the remote control 900
22 operated to complete the connection to the web site 106. Alternately, the national
23 broadcaster 110 may provide an overlay or hidden menu (both of which will be
24 described later) with a program that is currently being displayed on the television 170.
25 The overlay menu or the hidden menu may contain a hypertext link to the web site
26 106. The remote control 900 may then be used to select the hypertext link and the go
27 button operated to activate the hypertext link to the web site 106. The hypertext link
28 may also be provided at other web sites on the Internet 105. The national broadcaster
29 110 may also provide a logo that overlays a broadcast program. In this case, the logo
30 acts as a hypertext link. By selecting the logo, and operating the go button, the web
31 site 106 may also be accessed.

1 In the above examples, the web site 106 may be displayed as a full screen
2 display. Optionally, the web site 106 may be displayed in a separate window, or in
3 a picture-in-picture format, so that the broadcast program continues to be displayed
4 and seen on the television 170. The window containing the web site 106 display may
5 be scaled or repositioned on the display of the television 170.

6 The web site 106 may include a single page listing the program choices in an
7 electronic program guide, such as the program guide 300 shown in Figure 8.
8 Alternately, the web site 106 may include multiple pages that are accessed through
9 hypertext links or by operation of "forward", "back" and "home" buttons that are part
10 of the web site 106 display. The additional pages may contain additional program
11 choices, when, for example, the number of choices exceed that which can be
12 conveniently displayed on one page. The web site 106 may also include additional
13 pages that provide program description information, program reviews, information
14 regarding performers, and other related information.

15 The web site 106 may be used to directly order programs. For example, the
16 order signal 190 may be generated by selecting a program from the program guide
17 300, and operating the go button of the remote control 900 to send the order signal
18 190 to the web site 106.

19 The smart card 180 is similarly connected to the web site 106. The smart card
20 180 may incorporate a cable modem, a telephone modem, a wireless modem or a fiber
21 optic connector, for example.

22 The subscriber using the digital television 177 may use the personal computer
23 172, which is coupled to the modem 173, to access the web site 106 and to view the
24 program guide 300 and order programs for display on the digital television 177. The
25 computer 172 may communicate with the television 177 by wired or wireless means.
26 In Figure 12, the computer 172 is shown sending the local authorizations code 197
27 to the television 177 may be wireless. Wireless communication may be by infra red
28 or radio frequency signaling, for example.

29 While the modem 173, the smart card 180, and the set top terminal 220 are all
30 shown connecting to the web site 106 over the cable 147, the connection is not
31 limited in this respect. The web site 106 may be accessed over a variety of different

1 telecommunications systems such as the POTS, a coaxial cable, a fiber optic cable,
2 T1 and T3 lines, Integrated Services Digital Network (ISDN) lines and Asymmetric
3 Digital Subscriber Lines (ADSL) or by wireless means.

4 The set top terminal 220, the smart card 180 and the modem 173 are all used
5 to send the order signal 190 to the scheduling web site 106 and to view programs
6 listed in the program guide 300. The order signal 190 indicates which program from
7 the program guide is desired for viewing, and includes an address of the terminal
8 requesting the program. When the scheduling web site 106 receives the order signal
9 190, it sends an authorization request 196 to the order and authorization system 179.
10 The authorization request 196 includes an identity of the desired program and the
11 address of the terminal requesting the program.

12 The order and authorization system 179 prepares an authorization signal 191
13 that is transmitted to the network controller 214. The network controller 214
14 produces the local authorization code 197' and multiplexes the local authorization
15 code 197' with the programming 197. The network controller 214 then broadcasts the
16 programming 197 to the terminal connected to the local cable system 114. Only those
17 terminals that receive an authorization code with a matching address are able to
18 decrypt and display the programming.

19 The order and authorization system 179 also sends the authorization request
20 196 to the billing system 194. The billing system 194 generates a billing record,
21 which may be used to bill the subscribers for programs watched.

22 The order and authorization system 179 may include an escape feature for
23 pay-per-view events. For example, if a subscriber decides, after ordering a program,
24 not to watch the program, the subscriber may send a cancel program signal 192 to the
25 web site 106. Software incorporated in the web site 106 or the order and
26 authorization system 179 may include a time out feature. The time out feature allows
27 the subscriber to view an ordered program for a short time, five minutes, for example,
28 before the authorization request 196 is sent to the billing system 194.

29 If the subscriber sends the cancel program signal 192, the web site 106 or the
30 order and authorization system 179 may generate a deauthorization signal 193. The
31 deauthorization signal 193 is then sent to the terminal 140 that originated the cancel

1 program signal 192. The deauthorization signal 193 can be multiplexed into the
2 programming 197, or may be sent over the cable 147.

3 Figure 12 shows a digital television environment 144 in which a national
4 broadcaster 110, a broadcast affiliate 112, or a local cable system 114 provides digital
5 broadcast programming to subscribers, but program authorization is handled over the
6 Internet 105. That is, the local authorization code 197' is provided from the web site
7 106 to the terminal 140. The local authorization code 197' is based on an address
8 built into the set top terminal 220, for example.

9 The programming 197 may be received by subscribers having terminals with
10 different reception capabilities. The set top terminal 220 receives the programming
11 197 and may provide programs for display on the television 170. The television 170
12 may be a digital or an analog television. If an analog television, the set top terminal
13 220 converts the digital programs provided by the programming 197 into NTSC-
14 compatible analog signals.

15 The digital television 177 also receives the programming 197. The digital
16 television 177 displays those programs for which the local authorization code 197' is
17 provided.

18 The digital television 171 equipped with the smart card 180 also receives the
19 programming 197. The digital television 171 displays those programs for which the
20 local authorization code 197' is provided.

21 In the environment 144 shown in Figure 12, the subscriber both orders the
22 programming 197 and receives authorization to view the programming 197 by signals
23 sent to, and received from the web site 106, respectively. The electronic program
24 guide, such as the program guide 300 shown in Figure 8, is also provided at the web
25 site 106. That is, in the environment 144, the subscribers view the national
26 broadcaster's program selections by accessing the web site 106 on the Internet 105.
27 The national broadcaster 110, the national affiliate 112, or the local cable system 114
28 may create the web site 106, and provide the web site 106 with the program guide
29 300. The subscribers then make program selections directly from the web site 106.

30 Referring to Figure 12, the set top terminal 220 is shown coupled to the web
31 site 106. The set top terminal 220 may be coupled by a cable modem, a telephone

1 modem, a wireless modem, T1 and T3 lines, Integrated Services Digital Network
2 (ISDN) lines and Asymmetric Digital Subscriber Lines (ADSL), for example. The
3 display of the television 170 may be used as the display for viewing the web site 106.
4 The remote control 900 may be used for sending commands to the set top terminal
5 220, which are then relayed to the web site 106 for selecting and ordering programs
6 from the program guide 300. The web site 106 may also incorporate features such as
7 a soft key board to increase its functionality.

8 The smart card 180 is similarly connected to the web site 106. The smart card
9 180 may incorporate a cable modem, a telephone modem, a wireless modem or a fiber
10 optic connector, for example.

11 The subscriber using the digital television 177 uses the personal computer
12 172, which is coupled to the modem 173 to access the web site 106 and to view the
13 program guide 300 and to order programs for display on the digital television 177.

14 While the modem 173, the smart card 180, and the set top terminal 220 are all
15 shown connecting to the web site 106 over the cable 147, the connection is not
16 limited in this respect. The web site 106 may be accessed over a variety of different
17 telecommunications systems such as the POTS, T1 and T3 lines, Integrated Services
18 Digital Network (ISDN) lines and Asymmetric Digital Subscriber Lines (ADSL) a
19 coaxial cable, a fiber optic cable, or by wireless means.

20 The set top terminal 220, the smart card 180 and the modem 173 are all used
21 to send order signals 190 to the scheduling web site 106 to view programs listed in
22 the program guide 300. The order signal 190 indicates which program from the
23 program guide 300 is desired for viewing, and includes an address of the terminal
24 requesting the program. When the scheduling web site 106 receives the order signal
25 190, it sends an authorization request 196 to the order and authorization system 179.
26 The authorization request 196 includes an identity of the desired program and the
27 address of the terminal requesting the program.

28 The order and authorization system 179 prepares an authorization
29 confirmation signal 196' that is transmitted to the subscriber's terminal, such as the
30 set top terminal 220. The national broadcaster 110, for example, broadcasts the
31 programming 197 to the subscriber's terminals 140, such as the set top terminal 220.

1 Only those subscriber's terminals 140 that receive the authorization confirmation
2 signal 196' with a matching address are able to decrypt and display the programming.

3 The order and authorization system 179 also sends the authorization request
4 196 to the billing system 194. The billing system 194 generates a billing record,
5 which is used to bill the subscribers for programs watched.

6 The cable 147 may also be used for other communications with the web site
7 106. For example, if a subscriber decides, after ordering a program, not to watch the
8 program, the subscriber may send a cancel program signal 192 to the web site 106.
9 Software incorporated in the web site 106 or the order and authorization system 179
10 may include a time out feature. The time out feature allows the subscriber to view an
11 ordered program for a short time, five minutes, for example, before the authorization
12 request 196 is sent to the billing system 194.

13 If the subscriber does not send the cancel program signal 192, the web site 106
14 or the order and authorization system 179 may generate a deauthorization signal 193.
15 The deauthorization signal 193 is then sent via the cable 147 to the terminal 140 that
16 originated the cancel program signal 192.

17 The cable 147 may also be used to complete the program billing process. The
18 billing system may send a debit signal (not shown) over the cable 147 to the terminal
19 140. The received debit signal debits a cash card (not shown) contained in the
20 terminal 140. The cash card could be part of the smart card 180. The cash card may
21 be removable or fixed to the smart card 180. Increases in value of the smart card 180
22 may also be accommodated over the cable 147. For example, the order and
23 authorization system 179 may send a credit signal (not shown) to the terminal 140,
24 after the order and authorization system 179 receives a payment or electronic funds
25 transfer from a subscriber.

26 The order and authorization system 179, or other remote location may send
27 messages to terminals in the broadcast television environment 144. For example, the
28 order and authorization system may send promotional messages to the terminal 140.
29 The promotional messages may advertise upcoming programs or suggest purchase of
30 special features such as a speciality sports program. The order and authorization
31 system may send targeted advertisements to the terminal 140, where the targeted

1 advertisements are selected based on a subscriber profile maintained in the local cable
2 system 114, for example. Targeted advertising is described in detail in copending
3 applications Serial No. 08/735,549, entitled NETWORK CONTROLLER FOR
4 CABLE TELEVISION DELIVERY SYSTEMS and in Serial No. 09/054,419,
5 entitled TARGETED ADVERTISEMENT USING TELEVISION DELIVERY
6 SYSTEMS, the disclosures of which are hereby incorporated by reference.

7 The terminals 140 may use the broadcast environment 144 for other
8 communications purposes. For example, the terminals 140 shown in Figure 12 may
9 send electronic mail to each other via the Internet 105, may access other web sites on
10 the Internet 105 and may participate in multimedia conference calls, for example.

11 In an embodiment, program access information, in the form of the local
12 authorization code 197' is provided to the terminal 140 from the national broadcaster
13 110, for example. Figure 13 shows the details of the local authorization code 197'.
14 The local authorization code 197' may be a frame format signal. The local
15 authorization code 197' may include a leading flag 401 at the beginning of the signal,
16 an address field 403, a terminal identifier 405, an information field 407 and a trailing
17 flag 411 at the end of the signal.

18 The eight-bit flag 401 that appears at the beginning of the frame and the eight-
19 bit flag 411 that appears at the end of the frame are used to establish and maintain
20 synchronization. The eight-bit flag may be a "01111110" bit-stream. The address
21 field 403 designates a 4-bit address for a given terminal 140. The address field 403
22 may also include one or more routing indicators (not shown). The routing indicators
23 may be used in the case where a signal, such as the local authorization code 197' must
24 pass through several nodes of a telecommunications network. The terminal identifier
25 405 is a 16-bit field that uniquely identifies each terminal 140 with a 15-bit
26 designation followed by an appended P/F bit 413. Although field size is provided by
27 this example, a variety of sizes can be used with the present invention.

28 The information field 407 is variable in length. The variable length feature
29 allows the local authorization code 197' to include a number of program
30 authorizations, as shown in Figure 13. The information field 407 includes an eight-bit
31 field 407' that contains an event number and a sixteen-bit field 407" that contains a

1 program identification. The event number 407' may be formatted so that each time
2 a particular program airs, the terminal 140 will be able to access the program. That
3 is, the subscriber will only have to pay once to view the program for an indefinite
4 number of showings in the future. The number of showings could be limited to those
5 showing that occur in the current month, for example. The terminal 140 is able to
6 access any program identified in the information field 407. Other methods for
7 identifying programs are described in U.S. Patent 5,659,350, entitled OPERATIONS
8 CENTER FOR A TELEVISION PROGRAM PACKAGING AND DELIVERY
9 SYSTEM, which is hereby incorporated by reference.

10 The P/F bit 413 may be used to command a polling response from the terminal
11 140 addressed, as described below. The P/F bit may be used to command the
12 terminal 140 to provide a response back to the national broadcaster 110, for example.
13 Such a response could command the terminal to report programs watched
14 information, for example, that is stored in a memory of the terminal 140. The
15 programs watched information could be used by the billing system 194 of Figures 10-
16 12 to generate the billing record. The programs watched information could also be
17 used for other purposes such as targeted advertising. Collection of such programs
18 watched data is described in U.S. Patent 5,600,364, entitled NETWORK
19 CONTROLLER FOR CABLE TELEVISION DELIVERY SYSTEMS, and in
20 copending application Serial No. 09/124,043, entitled METHOD AND APPARATUS
21 FOR GATHERING PROGRAMS WATCHED DATA, the disclosures of which is
22 hereby incorporated by reference.

23 In an embodiment, the local authorization code 197' is received by the
24 terminal 140 shown in Figure 3 and may be stored in the memory 163. When a
25 subscriber tunes the terminal 140 to a broadcast digital channel, the processor 161
26 will then compare the local authorization code 197' to the programming 197 to
27 determine if the subscriber is authorized to view the selected program. If
28 authorization is granted, the processor 161 then directs the decrypter 167 to decrypts
29 the selected program and displays the decrypted program on the display 162 of the
30 terminal 140.

1 In another embodiment, the processor 161 will instruct the tuner 166 to tune
2 to the channel carrying the authorized program at some time prior to the start of the
3 authorized program. For example, the tuner 166 may tune to the channel carrying the
4 authorized program one minute prior to the start of the program. The processor 161
5 may be programmed by the subscriber to execute commands upon the occurrence of
6 certain events. For example, the processor 161 may be programmed to instruct an
7 attached recording device to record a program using a “tape program” command. If
8 the subscriber has chosen “tape program,” the processor 161 will begin recording the
9 program on the attached VCR or other recording device at the start of the authorized
10 program. If the display 162 of the terminal 140 is off, and the subscriber has chosen
11 “turn on television,” the processor 161 will turn on the display 162. If the subscriber
12 has not chosen “turn on television,” and the television is off, but the “tape program”
13 command is pending, the processor 161 will instruct the VCR, or other recording
14 device, to begin recording the program at the start of the selected program. The
15 processor 161 may also be programmed to pause, or stop, recording, during
16 commercial breaks, if any, in the programming 197. Recording of the program ends
17 when the program is complete. The processor 161 may then return the tuner 166 to
18 the channel previously selected, if a free channel, tune to the next authorized program,
19 or tune to a menu channel that provides the program guide 300.

20 Figure 14 is a diagram of the smart card 180 that may be incorporated into the
21 terminal 140 of Figures 4a-4c. For example, the smart card 180 may be incorporated
22 into the television 171 of Figure 4b or the television 177 of Figure 4c. A
23 microprocessor 181 controls all the functions of the smart card 180. A
24 communications interface 183 provides communications with external sources such
25 as a personal computer or a digital camera (not shown) through a RS-232 cable and
26 connector (not shown), for example. The communications interface 183 may also be
27 used to connect to the national broadcaster 110, or wireless means such as infra red
28 or radio frequency signaling, for example. For communications with the national
29 broadcaster 110, the communications interface 183 may include one or more of a one-
30 way cable modem, a two-way cable modem, a telephone modem, a wireless modem,
31 an ethernet connector, or a fiber optic connector, for example. A memory 185 stores

1 programming instructions for the microprocessor 181 and data provided by devices
2 external to the smart card 180. The memory 185 may be a RAM, a SRAM, a
3 SDRAM, an EEPROM or other suitable memory device. A connector 187 provides
4 external communications with components of the set top terminal 220.

5 The programming instructions in the memory 185 may be updated by loading
6 programming instructions from the local cable system 114, the broadcast affiliate 112,
7 or the national broadcaster 110. The programming instructions may also be loaded
8 from the web site 106. Thus, if the broadcast associate 112, for example, changes the
9 way in which the programming 115 is provided, the broadcast associate 112 may send
10 programming instructions along with the programming 115 to the terminals 140. The
11 changed programming instructions may replace or modify programming instructions
12 that are stored in the memory 185.

13 Also shown in Figure 14 is a data storage device 189. The data storage device
14 189 may be removable, or may be affixed permanently to the smart card 180. The
15 data storage device 189 may store program control information, program information,
16 and subscriber specific data, for example. Program control information may be used
17 to generate menu information for currently available programs. The program control
18 information may also be used to control display of programs on the television 171.
19 The program information may be a preview of an upcoming program, or may be the
20 entire program or a portion of the entire program. For example, the first five minutes
21 of all pay-per-view movies that are available in a given month may be stored in the
22 data storage device 189. In this embodiment, once a program is selected, and
23 authorized, the first part of the program is displayed, and the remaining portion of the
24 program is supplied by the national broadcaster 110.

25 The smart card 180 may also include a cash card module (not shown). The
26 cash card may be fixed or removable. The cash card may receive credits and debits
27 from a remote locations such as the order and authorization system 179 and the billing
28 system 194.

29 The data storage device 189 may also store entire programs. For example, the
30 data storage device 189 may store one or more movies. In addition, the data storage
31 device 189 may store advertisements, including advertisements targeted to the

1 subscriber. Targeted advertising is described in detail in copending applications
2 Serial No. 08/735,549, entitled NETWORK CONTROLLER FOR CABLE
3 TELEVISION DELIVERY SYSTEMS and in Serial No. 09/054,419, entitled
4 TARGETED ADVERTISEMENT USING TELEVISION DELIVERY SYSTEMS
5 the disclosures of which are hereby incorporated by reference.

6 The data storage device 189 may be programmed to record programs watched
7 data and click stream data. The programs watched data may be used to target the
8 advertisements and as part of a billing and account system. Data recorded on the data
9 storage device 189 may be provided to a remote location such as the local cable
10 company 114 in response to a polling request message. Alternately, the data storage
11 device 189 may provide data to a remote source through another data transfer scheme
12 such as carrier sense multiple access with collision detection/collision avoidance
13 (CSMA/CD). Finally, the data storage device 189 may be taken to, or sent to the
14 local cable company 114, for example, where its contents are read.

15 **C. Menu System for Broadcast Program Ordering**

16 A broadcast provider, such as the national broadcaster 110 may provide a
17 menu of available programs, in the form of an electronic program guide (EPG). The
18 program guide may be provided on a broadcast channel, and is displayed at the
19 terminal 140 so that a subscriber can select a program for viewing. The program
20 guide may also be provided at the web site 106 on the Internet 105. Finally, rather
21 than an electronic program guide, the menu may be provided in a hard copy format,
22 with program codes listed.

23 When the program guide is broadcast by the broadcast provider, the program
24 guide may be displayed on a subscriber's television. This situation is shown in Figure
25 10. In particular, the set top terminal 220 and the smart card 180 may receive the
26 program guide. In this embodiment, the program guide may be provided as program
27 data. One or more program guide templates may then be used in the set top terminal
28 220 and the smart card 180 to generate the program guide. Details for generating the
29 program guide, or menu, using the program guide data and the template are provided
30 later. Alternately, the program guide may be provided by the broadcast provider and
31 displayed directly on the television 170 and the television 171.

1 When the program guide is provided on the web site 106, the program guide
2 may be downloaded to the subscriber's computer, such as the personal computer 172,
3 shown in Figure 11. The program guide may also be downloaded to the set top
4 terminal 220 and the smart card 180 shown, for example in Figure 11, and may be
5 displayed on the television 170 and the television 171, respectively.

6 An entire listing of available programs versus time of viewing may be too
7 large to be easily displayed on a television display. The program guide 300, shown
8 in Figure 8, may therefore be scrolled using the cursor keys of the remote control 900,
9 for example, to allow the display of future television programming. For example, the
10 program guide 300 may be scrolled to display television programming scheduled for
11 viewing eight hours or 24 hours in the future. If the number of available channels is
12 also too large to be easily displayed, the channels may also be scrolled using the
13 cursor keys of the remote control 900.

14 Figures 15a-15d are alternate examples of electronic program guides that may
15 be used with the broadcast environment of Figure 1. Figure 15a shows an alternate
16 program guide 310 that lists available program choices. In Figure 15a, an upper
17 window 311 identifies the program provider, such as the national broadcaster 110.
18 Additional information such as time and date information may also be provided in the
19 upper window 311. Finally, a hypertext link or logo (shown in Figure 15 a as a star),
20 or hot button to a web site may be included in the upper window 311. The web site
21 may contain additional information about the program provider, preview information
22 regarding upcoming programs, special features such as a package of NFL games that
23 a subscriber can purchase, promotional programs and other advertising. A central
24 window 313 displays program choice information. For example, the central window
25 313 could display available programs by title. The control window 313 could also
26 include additional information such as program rating, next available viewing time,
27 and channel number, for example. A lower window 315 may contain access buttons
28 that allow the subscriber to access other submenus or menus related to the program
29 guide 310. For example, the lower window could include a "go back" button that
30 returns the subscriber to the previous menu, a "forward" button that sends the
31 subscriber to the next submenu in the sequence of menus, if available, a "return to

1 program" button that returns the display to the last selected channel, and an
2 interactive button that allows the subscriber to access interactive services including
3 access to the Internet 105 and other online services, and Internet service providers.

4 Alternately, operation of the go button may cause a submenu to be displayed.
5 Figure 15b shows an order submenu 320 that is displayed when the go button of the
6 remote control 900 is operated. The order submenu 320 includes a program
7 description window 321 that may provide a textual description of the selected
8 program. The window 321 may also display a video clip or a still image related to the
9 selected program. Additional windows, or banners may also be incorporated into the
10 order submenu 320. A top window 322 may provide additional program information
11 such as rating, start and stop times of broadcast, and current time and date
12 information, for example. A bottom window 323 may incorporate soft keys and text
13 that prompt the viewer to select one of order program or return to the program guide
14 310. The bottom window 323 may also include additional features, by way of soft
15 keys, such as automatic "tune to program channel," "turn television on," and "record
16 program button." Referring to Figure 3, the "automatic tune" command causes the
17 tuner 166 to be tuned to the appropriate broadcast channel prior to the start time of
18 the program, for example, one minute prior to start. Alternately, the processor 161
19 may create a virtual channel prior to the program start, and cause the tuner to tune to
20 the virtual channel just prior to the program start. If the television is off at the time
21 of the program start, the command "turn television on" causes the processor 161 to
22 turn the television on so that the selected program may be viewed. The command
23 "record program", if selected, may cause the processor 161 to begin recording the
24 program on a VCR or other suitable recording device, for example. The television
25 need not be on for the record program order to be executed. In this case, the
26 processor 161 either creates a virtual channel, or causes the tuner to tune to the
27 appropriate broadcast channel just prior to the start of the program. The order
28 submenu 320 may also incorporate a feature that allows viewing of a program at one
29 of several start times, as selected by the viewer. For example, a movie broadcast on
30 a channel may be shown every three hours throughout a day, and the viewer has the
31 option of selecting a start time. Alternately, the viewer may select a program for

1 viewing, and be authorized to view the program at any time of the day. In this
2 alternative, the viewer may select the time that recording occurs.

3 While the above features may be incorporated into a window of the order
4 submenu, one or more of the features may also be incorporated into another submenu,
5 such as a confirm order submenu 330 shown in Figure 15c.

6 In another embodiment, the electronic program guide may be displayed as a
7 channel lineup menu 340 as shown in Figure 15d. In Figure 15d, programs are listed
8 in a column format with the associated broadcast channel indicated. This allows
9 some subscribers to manually tune to a particular channel to receive a program.

10 The channel lineup menu 340 includes program titles and may include
11 program ratings, times of broadcast start, length of program and cost, for example.
12 A subscriber selects a desired program by scrolling through the program list using the
13 scroll buttons on the remote control 900. When the scrolling stops, the program is
14 highlighted on the menu. The subscriber may then order the selected program by
15 operating the go button on the remote control 900. Referring to Figure 10, for
16 example, operation of the go button sends the order signal 190 to the order and
17 authorization system 179. The order and authorization system 179 acts on the order
18 signal 190, sending the local authorization code 197'. The terminal 140 that initiated
19 the order signal 190 receives the local authorization code 197', which includes the
20 address and identification of the terminal 140 that sent the order signal 190. The local
21 authorization code 197' may be stored in the memory of the terminal 140, or may be
22 used immediately to access the authorized program.

23 **D. Operation of the Broadcast Program Ordering System**

24 Figure 16 is a flow chart of the major steps associated with ordering and
25 receiving a pay-per-view program, and the subsequent billing cycle. The flow chart
26 assumes the broadcast environment 131 of Figure 11.

27 The process begins with step S100. In step S110, the set top terminal 220
28 accesses the web site 106. The web site 106 may be accessed by entering the address
29 of the web site 106 into a location window of a web browser, by activating a
30 hypertext link provided during the broadcast of current programming, an by activating

1 a hypertext link received from a different web site. The process then moves to step
2 S120.

3 In step S120, a data signal showing the web site 106 home page is transmitted
4 to the set top terminal 220, and the web site 106 home page is displayed on the
5 display of the television 170. The process then moves to step S130. In step S130, the
6 web site 106 receives the order signal 190 for a program selected by a subscriber.
7 The order signal 190 includes a program identifier and the address and identification
8 of the set top terminal 220. The process then moves to step S140.

9 In step S140, the web site 106 transmits the authorization request 196 to the
10 ordering and authorization system 179. The process then moves to step S150. In step
11 S150, the order and authorization system 179 determines if the set top terminal from
12 which the order signal 190 originated is authorized to receive the selected program.
13 The order and authorization system 179 may compare the rating of the selected program
14 to a preset rating limit provided by the subscriber, for example. The order
15 and authorization system 179 may determine if the subscriber's account is delinquent.
16 If the set top terminal 220 is not authorized to receive the selected program, the
17 process moves to step S160. Otherwise, the process moves to step S170.

18 In step S160, the order and authorization system 179 sends a message to the
19 set top terminal 220 stating that the selected program cannot be accessed, along with
20 the reason for no access. The process then moves to step S260 and ends.

21 In step S170, the order and authorization system 179 sends an authorization
22 signal 191 to the network controller 214. The process then moves to step S180. In
23 step S180, the network controller 214 multiplexes the local authorization code 197'
24 with the programming 197. The process then moves to step S190. In step S190, the
25 set top terminal 220 receives the local authorization code 197' and stores the local
26 authorization code 197' in the memory of the set top terminal 220. The process then
27 moves to step S200.

28 In step S200, the set top terminal 220 tunes to the channel carrying the
29 program for which the authorization signal applies. The program is then displayed
30 on the display of the television 170. The process then moves to step S210. In step
31 S210, the order and authorization system 179 starts a time out, with the beginning of

1 the time out corresponding to the start time of the displayed program. The process
2 then moves to step S220. In step S220, the time out has ended, and the order and
3 authorization system 179 determines if a cancel program order 192 has been received
4 from the set top terminal 220. If the cancel program order 192 has been received, the
5 process moves to step S230. Otherwise the process moves to step S250.

6 In step S230, the order and authorization system 179 sends a cancel program
7 signal 191" to the network controller 214. The process then moves to step S240. In
8 step S240, the network controller 214 sends a deauthorization signal 193 to the set top
9 terminal 220, and the set top terminal 220 tunes away from the now deauthorized
10 program. The process then moves to step S260 and ends.

11 In step S250, the time out has been completed without receipt of a cancel
12 program order 192, the order and authorization system 179 send a billing record to
13 the billing system 194. The process then moves to step S260 and ends.

14 E. Menu-Driven Program Selection

15 In a broadcast television environment, a menu-driven program selection
16 scheme may provide the subscriber with one-step access to all major menus, ranging
17 from hit movies to sport specials to specialty programs. From any of the major
18 menus, the subscriber can in turn access submenus and minor menus by cursor or
19 alpha-character access.

20 Different types of menus may be used in the broadcast television environment.
21 These menus include Program Selection menus and During Program menus. The first
22 series of menus, Program Selection menus, consists of an Introductory menu, a Home
23 menu, Major menus, and Submenus. The second series of menus, During Program
24 menus, consists of two primary types, Hidden menus and the Program Overlay
25 menus.

26 Immediately after the subscriber turns on the set top terminal 220, or the
27 television 170 of Figure 10, for example, the Introductory menu welcomes the
28 subscriber to the system. The Introductory menu may display important
29 announcements from the local cable system 114 shown in Figure 1, advertisements
30 from the national broadcaster 110, or other types of messages. In addition, the

1 Introductory menu can inform the subscriber if the cable headend 208 has sent a
2 personal message to the subscriber's particular set top terminal 220.

3 After the Introductory menu has been displayed the subscriber may advance
4 to the next level of menus, namely the Home menu. In an embodiment, after a certain
5 period of time, the menu system will advance by default to the Home menu. From
6 the Home menu, the subscriber is able to access all of the programming options. The
7 subscriber may either select a program directly by entering the appropriate channel
8 number from the remote control 900, or the subscriber may sequence through
9 incremental levels of menu options starting from the Home menu. The Home menu
10 lists categories that correspond to the first level of menus called Major menus.

11 If the subscriber chooses to sequence through subsequent menus, the
12 subscriber will be forwarded to the Major menu that corresponds to the chosen
13 category from the Home menu. The Major menus further refine a subscriber's search
14 and help guide the subscriber to the selection of his choice.

15 From the Major menus, the subscriber may access several submenus. From
16 each submenu, the subscriber may access other submenus until the subscriber finds
17 a desired television program. Similar to the Major menu, each successive level of
18 Submenus further refines the subscriber's search. The system also enables the
19 subscriber to skip certain menus or submenus and directly access a specific menu or
20 television program by entering the appropriate commands on the remote control 900.

21 The During program menus (including Hidden menus and Program
22 Overlay menus) are displayed by the set top terminal 220 only after the subscriber has
23 selected a television program. In order to avoid disturbing the subscriber, the set top
24 terminal 220 does not display the Hidden menus until the subscriber selects the
25 appropriate option to display a Hidden menu. The Hidden menus contain options that
26 are relevant to the program selected by the subscriber. For example, a Hidden may
27 contain options that enable a subscriber to enter an interactive mode or escape from
28 the selected program.

29 Program Overlay menus are similar to Hidden menus because they occur
30 during a program and are related to the program being viewed. However, the
31 Program Overlay menus are displayed concurrently with the program selected by the

1 subscriber. Most Program Overlay menus are small enough on the screen to allow
2 the subscriber to continue viewing the selected program comfortably.

3 As summarized above, images or programs may be selected for display by
4 sequencing through a series of menus. Figure 17 is an example of one possible
5 structure for a series of menus. Generally, the sequence of menus is structured with
6 an Introductory menu, a Home menu, various major menus and a multitude of
7 submenus. The submenus can include promotional menus and During Program
8 menus. For example, at the Home menu portion of the sequence of menus and
9 corresponding software routines, a subscriber may select one of the Major menus and
10 start a sequence of menu displays. Alternatively, a subscriber may go directly to a
11 major menu by depressing a menu select button on remote control 900.

12 At any time during the menu sequence, the subscriber may depress a Major
13 menu button to move into another series of menus. In this way, a subscriber may
14 move from Major menu to Major menu.

15 Shown in Figure 17 is a Major menu 1046 for the national broadcaster 110.
16 The Major menu 1046, and the accompanying submenus, allow the national
17 broadcaster's electronic program guide, such as the program guide 310 of Figure 15a,
18 to be incorporated into the menu driven program access system. Alternately, the
19 national broadcaster's electronic program guides could be provided as a stand-alone
20 product.

21 The various software subroutines executed by the set top terminal 220 allow
22 a subscriber to sequence the menus, navigating through the various menus of the
23 present invention. A subscriber may sequence back through menus or return to the
24 Home menu with a single touch of the Home menu button on remote 900.

25 An Introductory menu screen 1000 automatically appears upon power-up and
26 initialization of the set top terminal 220. From this Introductory menu screen 1000,
27 the set top terminal software will normally advance the subscriber to the Home menu
28 screen 1010. The Home menu 1010 is the basic menu that the subscriber will return
29 to in order to make the first level of viewing decisions. When the set top terminal
30 software is displaying the Home menu 1010, the subscriber is able to access any
31 television programming option. The software allows programming options to be

1 entered through cursor movement on the screen and directly by button selection on
2 the remote control 900.

3 In the normal progression through the menu screens, the software will forward
4 the subscriber to a Major menu screen 1020 in response to the subscriber's remote
5 control 900 selection or highlighted cursor selection from the Home menu screen
6 1010. The selections displayed on the Home menu 1010 are for large categories of
7 programming options.

8 Following the Major menu 1020, the subscriber may navigate through one or
9 more submenu screens 1050 from which the subscriber may choose one particular
10 program for viewing. For most programming selections, the subscriber will proceed
11 from the Home menu 1010 to a Major menu 1020 and then to one or more submenus
12 1050. However, for certain programming options or functions of the set top terminal
13 220, the subscriber may skip one or more menus in the sequence.

14 The During Program menus are submenus enabled by the set top terminal
15 software only after the subscriber has selected a television program. These menus
16 provide the subscriber with additional functionality and/or additional information
17 while viewing a selected program. The During Program menus sequence can be
18 further subdivided into at least two types of menus, Hidden menus 1380 and Program
19 Overlay menus 1390.

20 To avoid disturbing a subscriber during viewing of a program, the Hidden
21 menus 1380 are not shown to the subscriber but instead "reside" at the set top
22 terminal 220. The set top terminal 220 awaits a button entry either from the remote
23 control 900 or the set top terminal 220 buttons before executing or displaying any
24 Hidden menu 1380 options. The set top terminal software provides the subscriber
25 with additional functions such as entering an interactive mode or escaping from a
26 selected program through use of Hidden menus 1380.

27 Program Overlay menus 1390 are similar to Hidden menus 1380. However,
28 the Program Overlay menus 1390 are overlayed onto portions of the displayed video
29 and not hidden. The software for the Program Overlay menus 1390 allows the
30 subscriber to continue to watch the selected television program with audio but places
31 graphical information on a portion of the television screen. Most Program Overlay

1 menus 1390 are graphically generated to cover small portions of video. Some
2 Program Overlay menus 1390, which are by their nature more important than the
3 program being viewed will overlay onto greater portions of the video. Examples of
4 types of Program Overlay menus 1390 include Notification menus 1392 and
5 Confirmation menus 1394. In an embodiment, the software for the Program Overlay
6 menus 1390 controls the reduction or scales down the (entire) programs video and
7 redirects the video to a portion of the screen.

8 Submenus may provide the cost of viewing the program and the program's
9 length in hours and minutes. From the submenus, the subscriber is given at least three
10 options: (1) to purchase a program, (2) to return to the previous menu, and (3) to press
11 "go" and return to regular TV. The subscriber may also be given other options such
12 as previewing the program.

13 Using an on-screen menu approach to program selection, there is nearly an
14 unlimited number of menus that can be shown to the subscriber. The memory
15 capability of the set top terminal 220 and the quantity of information that is sent using
16 the program control information signal are the only limits on the number of menus
17 and amount of information that can be displayed to the subscriber. The approach of
18 using a series of menus in a simple tree sequence is both easy for the subscriber to use
19 and simply implemented by the set top terminal 220 and remote control device 900
20 with cursor movement. A user interface software programmer will find many obvious
21 variations from the preferred embodiment described.

22 The set top terminal 220 may generate and create menus using, in part,
23 information stored in its graphics memory. Referring to Figures 18a-18c, a
24 background graphics file 800 will store menu backgrounds and a logo graphics file
25 820 will store any necessary logos. A menu display and cursor graphics file 850 will
26 store menu display blocks and cursor highlight overlays as well as any other
27 miscellaneous files needed to build the menus. Using this method of storing menus,
28 the menus can be changed by reprogramming a graphics memory 620 of the set top
29 terminal 220 through instructions from either the network controller 214 or operations
30 center 202.

1 A microprocessor in the set top terminal 220 performs the steps required to
2 create a menu using stored information. The microprocessor fetches a background
3 file, logo file, menu display and cursor file in most instances. The microprocessor
4 fetches text from long-term 875, intermediate-term 877, or short-term 879 storage
5 depending on where the text is stored. Using a video combiner 886 (or like device),
6 the stored information is combined with video and the entire image is sent to the
7 television screen 888 for display.

8 In an embodiment, a graphics controller is used to assist the set top terminal
9 220 in generating menus. Menu generation by the set top terminal 220 begins with
10 the building of a Major menu screen, which includes background graphics for that
11 Major menu 1020. The background graphics may include an upper window across
12 the top of the screen and a lower window across the bottom of the screen. The
13 background graphics may be generated from the background graphics file 800 in the
14 memory files of the graphics memory. In addition, logo graphics may be generated.
15 Such graphics may include an icon window, a cable company logo, a channel
16 company logo, and two "go" buttons.

17 The text for each Major menu 1020 may be generated separately by a text
18 generator in the set top terminal 220. Those portions of the text that generally remain
19 the same for a period of weeks or months may be stored in EEPROM or other local
20 storage. Text that changes on a regular basis, such as the movie titles (or other
21 program selections), is transmitted to the set top terminal 220 by either the operations
22 center 202 or the network controller 214 of the cable headend 208. In this manner,
23 the cable headend 208 may change the program selections available on any Major
24 menu 1020 by modifying the program control information signal sent by the
25 operations center 202 and transmitting any changes using a set top terminal control
26 information signal (STTCIS).

27 Day, date and time information may be added to each Major menu 1020. This
28 information is sent from the operations center 202, the cable headend 208 (signal
29 processor 209 or network controller 214), the uplink site, or generated by the set top
30 terminal 220 internally.

1 The creation and display of program description submenus is performed by
2 the set top terminal 220 in a manner similar to that described above. Each submenu
3 may be created in parts and combined before being sent to the television screen.
4 Background graphics and upper and lower windows may be used. Likewise, a video
5 window and half-strip window can be generated from information in storage on the
6 EEPROM.

7 In addition to graphics and text, some submenus include windows that show
8 video. Such video may be still or moving pictures. Still pictures may be stored in a
9 compressed format (such as JPEG) at the set top terminal 220. Video stills may be
10 transmitted by the operations center 202 through the program control information
11 signal from time to time.

12 Moving video pictures may be obtained directly from a current video feed as
13 described above. Depending on video window size, this may require manipulation
14 of the video signal, including scaling down the size of the video and redirecting the
15 video to the portion of the menu screen which is within the video window of the
16 menu. Alternatively, the video may be obtained from a split screen channel. Such
17 a method involves the use of split screen video techniques to send multiple video
18 clips on a single channel at a given time. The set top terminal 220 would scale the
19 picture, if necessary, and redirect it to the correct position on the screen using known
20 scaling and positioning techniques. Additional circuitry may be required in the set
21 top terminal 220 to perform adequate scaling and repositioning.

22 To avoid the need for redirecting video into the portion of the screen which
23 houses the video window, masking and menu graphics may be used to cover the
24 portions of the channel video that are not needed. This masking technique allows the
25 split screen video to remain in the same portion of the screen that it is transmitted by
26 the operations center 202. The masking is then adjusted to cover the undesired
27 portions of the screen. These masks are stored in the background graphics file
28 similarly to other background files for menus.

29 The split screen video technique may also be used for promoting television
30 programming. Since a great number of short video clips may be sent continuously,
31 full or partial screen promotionals (or informationals) may be provided to the

1 subscriber. With this large quantity of promotional video, the subscriber is given the
2 opportunity to "graze" through new movie or television programming selections. The
3 subscriber simply grazes from promotional video to promotional video until the
4 desired television program is discovered.

5 F. Detailed Set Top Terminal Description

6 The set top terminal 220 receives and manipulates signals from the cable
7 headend 208. The set top terminal 220 is equipped with local computer memory and
8 the capability of interpreting the digitally compressed signal to produce menus for the
9 subscriber. The remote control 900 communicates the subscriber's selections to the
10 set top terminal 220. The subscriber's selections are generally based upon menus or
11 other prompts displayed on the television screen.

12 Figure 19 shows the basic hardware components of the set top terminal 220.
13 The set top terminal 220 has a tuner 603, digital demodulator 606, decryptor 600, and
14 demultiplexers 609, 616 as well as audio equipment 612 and a remote control
15 interface 626 for receiving and processing signals from the remote control unit 900.
16 A modem 627 allows communication between a microprocessor 602 and the cable
17 headend 208. An NTSC encoder 625 provides a standard NTSC video output.

18 The microprocessor 602 is capable of executing program instructions stored
19 in memory. These instructions allow a subscriber to access various menus by making
20 selections on the remote control 900.

21 The manner in which the video is decompressed and the menus are generated
22 from the program control information signal or STTCIS varies depending on the
23 specific embodiment of the invention. Video decompressors 618 and 622 may be
24 used if the video is compressed. The program control information signal may be
25 demultiplexed into its component parts, and a video decompressor 618, graphic
26 decompressor, text generator and video combiner 624 may be used to assist in
27 creating the menus.

28 In addition to the menu format information that is stored in graphics memory,
29 the set top terminal 220 also stores data tracking those programs that have been
30 selected for viewing. By gathering this data, the set top terminal 220 can maintain an
31 accurate record of all programs accessed/watched by storing the data in EEPROM or

1 RAM. Subsequently, this data can be transmitted to the cable headend 208, where it
2 can be used in carrying out network control and monitoring functions. Such data
3 transmissions between the set top terminal 220 and cable headend 208 can be
4 accomplished, for example, through upstream transmission over the cable network
5 or over telephone lines through the use of telephone modems. Where upstream
6 transmission over the cable network is used, the set top terminals 220 can complete
7 data transmissions on a scheduled (e.g., using a polling response or status report to
8 respond to polling requests sent from the cable headend 208) or as-needed (e.g., using
9 a random access technique) basis.

10 Figure 20a shows the front panel of the set top terminal 220, which includes
11 an infrared sensor 630 and a series of LED displays 640. The LED displays 640 may
12 indicate with an icon or a letter (e.g. A-K) the Major menu currently selected by the
13 set top terminal 220 or the channels selected directly by a subscriber, or menu channel
14 selections (e.g., from 1 to 50). Further displays may include current channel, time,
15 volume level, sleep time, parental lock (security), account balance, use of a hardware
16 upgrade, second channel being recorded by the VCR, use of the Level D music
17 hardware upgrade in a separate room, a channel being viewed on another television
18 that is coupled to the set top terminal 220, and any other displays useful to a
19 subscriber to indicate the current status of the set top terminal 220. The LEDs 640
20 may also provide an indication of the digital audio channel currently tuned.

21 The set top terminal 220 includes a flapped opening 635 on its front that
22 allows the insertion of a magnetic cartridge (or similar portable storage device,
23 including optical disk, ROM, EPROM, etc. not shown). This cartridge opening 635
24 allows the set top terminal 220 to be upgraded or reprogrammed locally with the use
25 of a magnetic tape cartridge.

26 On the top or cover of the set top terminal 220 are located pushbutton controls
27 645. Any function that can be performed on the remote 900 may also be performed
28 at the set top terminal 220 using the duplicative pushbutton controls 645.

29 Figure 20b shows the back of the set top terminal 220, which includes a pair
30 of output terminals 650, pair of input terminals 652, pair of stereo/audio output
31 terminals 654, satellite dish input port 656, telephone jack 658 and an RS-422 port

1 660. In addition, an upgrade port 662 and a cover plate 664 are held in place by a
2 series of sheet metal screws. One of the output terminals 650 is for a television and
3 the other is for a VCR or other video recording device. The set top terminal 220 is
4 equipped to handle incoming signals on one or two cables using the input terminals
5 652. The phone jack 658 and an RS-232 or RS-422 port 660 are provided for
6 maintenance, trouble shooting, reprogramming and additional customer features, such
7 as connection to a digital camera. In alternate embodiments, the telephone jack 658
8 may be used as the primary mode of communication between the cable headend 208
9 and the set top terminal 220. This connection is possible through the local telephone,
10 cellular telephone or a personal communications network (PCN).

11 The basic programming of each set top terminal 220 is located on ROM
12 within the set top terminal 220. Random access memory, the magnetic cartridge
13 capability, and the expansion card slot 635 each allow upgrades and changes to be
14 easily made to the set top terminal 220. The upgrade cards may be daisy-chained
15 together to provide greater functionality for the set top terminal 220.

16 In an embodiment, the set top terminal 220 includes a hardware upgrade port
17 662, in addition to expansion card slots. The hardware upgrade port 662
18 accommodates a four-wire (or more) connection for: (1) error corrected, decrypted
19 data output of the set top terminal 220, (2) a control interface, (3) decompressed video
20 output, and (4) a video input port. In an embodiment, multiple wires are used to
21 perform each of the four functions. The four sets of wires are combined in a single
22 cable with a single multipin connector.

23 Multipin connections may be used for the multiwire cable. The multipin
24 connection 662 may range from DB9 to DB25. A variety of small computer systems
25 interface (SCSI) ports may also be provided. Alternatively, four or more ports may
26 be provided instead of the single port depicted.

27 Another port 662 is used to attach the various hardware upgrades described
28 below to a set top terminal 220. An embodiment has a number of hardware upgrades
29 available for use with a set top terminal 220, including: (1) a Level A interactive unit,
30 (2) a Level B interactive unit, (3) a Level C interactive unit with compact disc
31 capability, (4) a Level D digital radio tuner for separate room use, and (5) a Level E

1 information download unit. Each of these upgrades may be connected to the set top
2 terminal 220 unit through the upgrade port 662 described earlier. The same four
3 wires in a single cable described earlier may be used.

4 Existing set top converter boxes such as those made by Scientific Atlanta or
5 General Instruments are presently unequipped to handle the menu selection system
6 of the present invention. Thus, hardware modifications are necessary in order to use
7 the menu selection system with existing set top converter technology.

8 An upgrade card addition to a set top converter is depicted in Figure 21. The
9 card 700 shown provides the additional functionality needed to utilize the menu
10 system with existing set top converter technology. The primary functions the card
11 700 adds to the set top converter are the interpreting of program control information
12 signals, generating of menus, sequencing of menus, and, ultimately, the ability of the
13 subscriber to select a channel through the menu system without entering any channel
14 identifying information. The card 700 also provides a method for a remote location,
15 such as the cable headend 208, to receive information on programs watched and
16 control the operation of the set top converter 220 and the card 700. The programs
17 watched information and control commands may be passed from the cable headend
18 208 to the card 700 using telephone lines coaxial cable, fiber optic cable, wireless
19 means and by satellite.

20 The primary components of the card 700 are a PC chip CPU 702, a VGA
21 graphic controller 704, a video combiner 706, logic circuitry 708, NTSC encoder 710,
22 a receiver 712, demodulator 714, and a dialer 716. The card 700 operates by
23 receiving the program control information signal from the cable headend 208 through
24 the coaxial cable. The logic circuitry 708 of the card 700 receives data, infrared
25 commands, and synchronization signals from the set top converter. Menu selections
26 made by the subscriber on the remote control 900 are received by the set top
27 converter's infrared equipment and passed through to the card 700. The card 700
28 interprets the infrared signal and determines the program (or menu) the subscriber has
29 selected. The card 700 modifies the infrared command to send the program selection
30 information to the set top converter 221. The modified infrared command contains
31 the channel information needed by the set top converter 220. Using the phone line

1 and dialer 716, the card 700 is able to transmit program access information to the
2 cable headend 208.

3 G. Program Control Information Signal

4 Throughout this application, the term "program control information" is used
5 to indicate control information coming from the cable headend 208 to the set top
6 terminal 220, whether it is sent directly from the operations center 202, processed by
7 the network controller 214 and then forwarded to the set top terminal 220, or
8 transmitted over telephone lines.

9 The program control information signal may reach the subscriber's home in
10 a compressed format and be decompressed prior to viewing. Included in the delivered
11 signal is information that enables equipment at the subscriber's home to display
12 menus for choosing particular programs. The delivered program signal may also
13 include the local authorization code, which allows for display of programs and
14 channels of programming. Depending on the particular embodiment, the television
15 program signal may arrive at the subscriber's home through one or more connections
16 such as coaxial cables, T1 and T3 lines, Integrated Services Digital Network (ISDN)
17 lines and Asymmetric Digital Signal Lines (ADSL) cables, twisted pairs, cellular
18 telephone connections, local area networks, direct satellite broadcasts, terrestrial
19 broadcasts, or personal communications network (PCN) hookups.

20 The program control information signal is generated by the operations center
21 202 and provides the network controller 214 with data on the scheduling and
22 description of programs. In an alternate configuration, this data is sent directly to the
23 set top terminal 220 for display to the subscriber. In an embodiment, the program
24 control information signal is stored and modified by the network controller 214 and
25 sent to the set top terminal 220 in the form of the STTCIS. The set top terminal 220
26 integrates either the program control information signal or the STTCIS with data
27 stored in the memory of the set top terminal 220 to generate on-screen menus that
28 assist the subscriber in choosing programs for display.

29 The types of information that can be sent using the program control signal
30 include: number of program categories, names of program categories, what channels
31 are assigned to a specific category (such as specialty channels), names of channels,

1 names of programs on each channel, program start times, length of programs,
2 description of programs, menu assignment for each program, pricing, whether there
3 is a sample video clip for advertisement for the program, and any other program,
4 menu or product information. As noted above, the program control signal may also
5 include local authorization codes.

6 With a minimal amount of information being communicated to the set top
7 terminal 220 on a regular basis, the set top terminal 220 is able to determine the
8 proper menu location for each program and the proper time and channel to activate
9 for the subscriber after a menu selection. The program control information signal and
10 STTCIS can be formatted in a variety of ways and the on-screen menus can be
11 produced using many different methods. For instance, if the program control
12 information signal carries no menu format information, the menu format for creating
13 the menus can be fixed in ROM at the set top terminal 220. In an embodiment, the
14 menu format information is stored at the set top terminal 220 in a temporary memory
15 device such as a RAM or EPROM. New menu format information is sent via the
16 program control information signal or the STTCIS to the set top terminals 200
17 whenever a change to a menu format is desired.

18 In an embodiment, the menu formats remain fixed and only the text changes.
19 In this way the program control information signal can be limited to primarily text and
20 a text generator can be employed in the set top terminal 220. Another simple
21 embodiment uses a separate channel full-time (large bandwidth) just for the menu
22 information.

23 Live video signals may be used in windows of certain menus. These video
24 signals can be transmitted using the program control information signal or STTCIS,
25 or can be taken off channels being transmitted simultaneously with the menu display.
26 Video for menus, promos or demos may be sent to the set top terminal 220 in several
27 formats, including (1) on a dedicated channel, (2) on a regular program channel and
28 scaled to size, or (3) along with the program control information signal. For example,
29 a large number of short promos or demo video may be sent using a split screen
30 technique on a dedicated channel. A multiple window technique may be used with

1 the menus to display a description of a program and one or more video frames that
2 assist the subscriber in selecting the program.

3 The program control information signal generated by the operations center 202
4 provides data on the scheduling and description of programs to the network controller
5 214 or, in an alternate configuration, directly to the set top terminal 220 for display
6 to the subscriber. In an embodiment, the program control information signal is stored
7 and modified by the network controller 214 and sent to the set top terminal 220 in the
8 form of the STTCIS. This configuration is required to accommodate differences in
9 individual cable systems and possible differences in set top terminal devices. The set
10 top terminal 220 integrates either the program control information signal or the set top
11 terminal control information stream together with data stored in the memory of the
12 set top terminal 220, to generate on-screen displays for assisting the subscriber in
13 choosing programs.

14 The goal of the menu driven program selection system is to allow the
15 subscriber to choose a program by touring through a series of menus, organized
16 generally as depicted in Figure 17, utilizing the remote control 900 for cursor
17 movement. The final choice in the series of menus will identify one particular
18 channel and one time for activation of that channel. Armed with a channel and
19 activation time the set top terminal 220 can display the selected program on the
20 television for the subscriber. To achieve this goal an intelligent alpha-numeric code
21 is assigned to each program. This alpha-numeric code identifies the category of the
22 program, the menu in which the program should be displayed, its transmission
23 time(s), and the position on the menu that the program should be displayed.

24 The program control information, including menu codes, may be sent
25 continuously from the operations center 202 to the network controller 214, and
26 ultimately to the set top terminal 220.

27 Table A shows the basic programming information that may be sent to the set
28 top terminal 220. The program descriptions shown are coded abbreviations. For
29 example, C for comedy, N for news, S for sports, A for cartoons, and Tx for text. If
30 there is a textual description for a program, such as a movie, the description may be
31 given following that program's coded description or may be communicated following

1 the four hours' worth of programming information. As is shown in the coded listing,
 2 program descriptions for programs greater than a half hour in length need not be
 3 repeated (each half hour). The video description code informs the set top terminal
 4 220 of whether there is still or live video available to advertise the program.

5 For example, a sporting program may be assigned a code of B35-010194-
 6 1600-3.25-Michigan St. vs. USC. The letter B would assign the program to category
 7 B, sports. The second alpha-numeric character number 3 would assign the program
 8 to the third menu of the sports category. The third character of the code, number 5,
 9 assigns the program to the fifth program slot on the third menu. The next six
 10 characters, 01/01/94, represent the date. The following four characters, 1600
 11 represent the start time which is followed by the length of the program and the
 12 program name. This entry represents a sports show, a college football game, which
 13 will be aired at 4:00PM on New Years day 1994.

14 **TABLE A**

15 **12:00 PM**

*Ch.	*Program name	*Program length	*Menu code	*Description	*Video
1	Cheers	.5	E24	C	N
2	Terminator	2.0	A33	Tx	S
3	PrimeTime	1.0	D14	N	N
4	Football Special	.5	B24	S	N

21 **12:30 PM**

*Ch.	*Program name	*Program length	*Menu code	*Description	*Video
1	Simpsons	.5	E14&C13	C	S
4	Football Game	3.0	B13	S	N
•					
•					

27 In the 12:30 Channel 1 entry of Table A, two menu codes are shown. By
 28 allowing two menu codes, programs that may fit under two different category
 29 descriptions may be shown in both menus to the subscriber. With this minimal

1 amount of information being communicated to the set top terminal 220 on a regular
2 basis, the terminal is able to determine the proper menu location for each program and
3 the proper time and channel to activate for the subscriber after his menu selection.

4 In the 12:30 Channel 1 entry of Table A, two menu codes are shown. By
5 allowing two menu codes, programs that may fit under two different category
6 descriptions may be shown in both menus to the subscriber. With this minimal
7 amount of information being communicated to the set top terminal 220 on a regular
8 basis, the terminal is able to determine the proper menu location for each program and
9 the proper time and channel to activate for the subscriber after his menu selection.

10 Table B shows an example Events Table that may be downloaded to a set top
11 terminal 220 using the Event.Dat file which contains information about events and

12 **TABLE B**

13 Field #	14 Field Type	
15 1	16 Event Type 17 1 = YCTV 2 = Pay-Per-View 3 = Reg. TV	18 Unsigned Int
19 2	20 Event ID	21 Unsigned Int
22 3	23 Global Channel ID	24 Unsigned Int
25 4	26 Price (in Cents)	27 Unsigned Int
28 5	29 Start Time	30 HH:MM:SS
31 6	32 End Time	33 HH:MM:SS
34 7	35 Start Date	36 MM/DD/YY
37 8	38 End Date	39 MM/DD/YY
40 9	41 P-Icon	42 ASCIIIZ
43 10	44 Name	45 ASCIIIZ
46 11	47 Description	48 ASCIIIZ

49 pricing. As shown in the table, the three columns of the Events Table identify the
50 field number, the field itself and the type of information downloaded in the Event.Dat
51 file. The first column contains the field numbers 1 through 11. The middle column
52 contains the corresponding field parameters, including the event type, event ID, global
53 channel ID, price, start time, end time, start date, end date, P- icon, name and
54 description. The third column contains corresponding field type information. Field
55 type information typically consists of an unsigned integer; hours, minutes and
56 seconds; months, day and year; and ASCII character identifier.

1 Table C shows an example Event.Dat data file. In particular, Table C shows
2 two data streams corresponding to two event types. The first data stream identifies
3 a YCTV™ event in the first field. The second field designates the event ID, which
4 is 1234 in this example. The third field includes the global channel ID number two.
5 The fourth field indicates the cost of 50 cents for this event. The fifth and sixth fields
6 indicate the respective start and end times of 3:00 AM to 3:00 PM, respectively. The
7 seventh and eighth fields show the corresponding start and end dates, designated as
8 8/25/93 and 8/27/93, respectively. Field nine indicates the P-icon set to PBS.PCX
9 graphics file. Finally, fields ten and eleven indicate the name and description of the
10 events selected, which in this case are Sesame Street™ and Barney™. The second
11 data stream in the Event.Dat example shown in Table C includes analogous
12 information for Terminator IV™, which is designated in field one as a pay-per-view
13 event.

TABLE C

15 Event.Dat Example

16 1`1234`2`50`03:00:00`15:00:00`08/25/93`08/27/93`pbs.pcx`Sesame Street &
17 Barney's Sesame Street and Barney Abstract
18 2`1234`2`50`20:00:00`22:00:00`08/25/93`08/25/93`t4.pcx`Terminator 4`Terminator
19 4 Abstract

20 The program control information signal and STTCIS can be formatted in a
21 variety of ways and the on-screen menus can be produced in many different ways.
22 For instance, if the program control information signal carries no menu format
23 information, the menu format for creating the menus can be fixed in ROM at the set
24 top terminal 220. This method allows the program control information signal to carry
25 less information but has the least flexibility since the menu formats can not be
26 changed without physically swapping the ROM.

27 In an embodiment, the menu format information is stored at the set top
28 terminal 220 in temporary memory either in a RAM, FLASH ROM, EEPROM or
29 EPROM. This configuration provides the desired flexibility in the menu format while
30 still limiting the amount of information needed to be communicated via the program
31 control information signal. New menu format information can be sent via the
32 program control information signal or the STTCIS to the set top terminals 220 each
33 time there is a change to a menu.

1 Program access information for each program watched is stored at the set top
2 terminal 220 until it is polled by the network controller 214 for information retrieval
3 using the program control information signal or STTCIS. This information retrieval
4 can be accomplished by using the polling request message and response formats, 920
5 and 920' respectively, as shown, and Figures 22a and 22b, and described below, but
6 any suitable polling request and response message format may be used to interrogate
7 each set top terminal 220 sequentially, one by one. The set top terminals 220 are
8 identified by a unique address and set top terminal identifier. The set top terminal
9 220 may transmit information and messages to the network controller 214 only when
10 given permission by the network controller 214 to do so.

11 Where, for example, specialty programs have been accessed since the
12 previous poll, the set top terminal 220 is given permission to transmit a polling
13 response 920' in the form of a status report that includes any such access information.
14 The network controller's control receiver (not shown) is tasked with the receipt of set
15 top terminal polling responses or status reports. These status reports generally include
16 information that allows the network controller 214 to track a subscriber's program
17 access history.

18 Figure 22a shows an embodiment of a frame format message 920 used for
19 polling the set top terminals 220. This frame format 920 consists of six fields,
20 namely: (1) a leading flag 922 at the beginning of the message, (2) an address field
21 924, (3) a subscriber region designation 926, (4) a set top terminal identifier 928 that
22 includes a polling command/response (or P/F) bit 930, (5) an information field 932,
23 and (6) a trailing flag 934 at the end of the message.

24 The eight-bit flag sequence 922 that appears at the beginning and end of a
25 frame is used to establish and maintain synchronization. Such a sequence typically
26 consists of a "01111110" bit-stream. The address field 924 designates a 4-bit address
27 for a given set top terminal 220. The subscriber region designation 926 is a 4-bit field
28 that indicates the geographical region in which the subscriber's set top terminal 220
29 is housed. The set top terminal identifier 928 is a 16-bit field that uniquely identifies
30 each set top terminal 220 with a 15-bit designation followed by an appended P/F bit

1 930. Although field size is provided by this example, a variety of sizes can be used
2 with the invention.

3 The P/F bit 930 is used to command a polling response from the set top
4 terminal 220 addressed, as described below. The response frame format 920' also
5 provides a variable-length information field 932' for other data transmissions, such
6 as information on system updates. The frame format 920' ends with an 8-bit flag (or
7 trailing flag) 934' that is identical in format to the leading flag 922', as set forth
8 above. Other frame formats (e.g., MPEG) will be apparent to one skilled in the art
9 and can be easily adapted for use with the system.

10 Figure 22b shows an example of frame format 920' for the status reports
11 received from the set top terminals 220 during the polling cycle. This frame format
12 is identical to the polling request message format 920 and, as described, includes: (1)
13 a leading flag 922' at the beginning of the message, (2) an address field 924', (3) a
14 subscriber region designation 926', (4) a set top terminal identifier 928' that includes
15 a polling command/response (or P/F) bit 930', (5) an information field 932', and (6)
16 a trailing flag 934' at the end of the message.

17 The information field 932' remains variable in length so that the status of an
18 indeterminate number of programs, represented at 931, accessed can be included in
19 the frame. In this way, the control message length of the polling request message is
20 minimal since the network controller 214 does not transmit such access information.
21 After a polling response by a given set top terminal 220, however, the control
22 message length increases in proportion to the number of programs accessed.

23 During transmission, the P/F bit is used to carry out the polling function. In
24 particular, the P/F bit is set to a "1" position to command a polling response from the
25 set top terminal 220 whose address is identified in the frame. The set top terminal
26 220 addressed must respond to the command in the same P/F bit also set to the "1"
27 position. The response will include the number of programs accessed and their
28 corresponding event identification numbers as shown in Figure 22b at 931. In cases
29 where the set top terminal 220 has not accessed any programs since the previous
30 polling cycle, the set top terminal 220 responds with the P/F bit set to "1" and the
31 programs access block denoting zero programs accessed.

1 Through the polling cycle, the network controller 214 acquires the
2 information needed to operate the system 200. During the polling cycle, the network
3 controller 214 sends signals to the set top terminals 220 to authorize both their
4 operation and access to specific channels. If, for example, a subscriber has failed to
5 pay a recent bill, the network controller 214 can deauthorize the subscriber's set top
6 terminal 220. Likewise, when the subscriber orders a program or channel, the
7 network controller 214 checks the subscriber's account for good standing by reading
8 the proper database file. After the check, the network controller 214 then either
9 authorizes or deauthorizes access by the set top terminal 220. The authorization and
10 deauthorization may be provided by any of the methods described with respect to
11 Figures 10 - 12, for example. As a result, the cycle requires a series of requests and
12 responses to operate.

13 A second method for the network controller 214 to receive information from
14 the set top terminals 220 is through the use of a random access scheme. In this
15 method, individual set top terminals 220 can send control-related messages to the
16 network controller 214 without being polled. This scheme is particularly useful in
17 networks where subscriber regions include potentially large numbers of subscribers.
18 High concentrations of subscribers may be found, for example, in large metropolitan
19 areas. In such cases, the polling cycle can be replaced with a more sophisticated
20 random access strategy such as carrier-sense multiple access with collision detection
21 (CSMA/CD). In this scheme, each set top terminal 220 must "listen" before it
22 transmits and then does so only if it senses an idle medium. When the return link to
23 the network controller 214 is silent, a given set top terminal 220 can transmit its
24 messages. Any messages sent from a set top terminal 220 to the network controller
25 214 would set the P/F bit 930' to a "0" position to indicate that the message is not in
26 response to any command or polling request. In addition to CSMA/CD, other random
27 access schemes can be used with the system, such as CDSL. Yet another method for
28 the network controller 214 to receive information from the set top terminals 220 is
29 through the use of modems. In this arrangement, the set top terminals 220
30 communicate program access information and orders to the network controller 214
31 using telephone modems. The set top terminals 220 are equipped with a modem port

1 to facilitate such operation. Thus, communications between a given set top terminal
2 220 and the network controller 214 can be established over telephone lines or other
3 media when cable traffic or other primary traffic is congested. A method includes
4 using modems in combination with a control or "hit" signal from the network
5 controller 214. A group (or region) of set top terminals 220 is "hit" simultaneously
6 by the network controller 214 via the cable. Only those set top terminals 220 within
7 the group that have data for the network controller 214 call the network controller 214
8 by modem. The network controller 214 is equipped with a bank of modems
9 (organized to roll-over telephone calls) to answer the incoming calls.

10 Among the methods discussed for the network controller 214 to receive
11 information from the set top terminals 220, polling allows the network controller 214
12 to conduct and control communications with set-top terminals 220 over the cable
13 network in an orderly fashion. In particular, the network controller 214 can schedule
14 data retrieval by polling the set top terminals 220 one by one. A random access
15 method, on the other hand, does not allow the network controller 214 to maintain
16 such orderly communications. Instead, the network controller 214 receives data from
17 the set top terminals 220 at random, depending on when the cable medium is idle.
18 This random reception of data lessens the degree of control that the network
19 controller 214 has over set top terminal transmissions.

20 In between polling cycles, the program control information continues to
21 supply the set top terminals 220 with menu information. In the simplest embodiment,
22 the menus remain fixed and only the text changes. Thus, the program control
23 information signal can be limited to primarily text and a text generator can be
24 employed in the set top terminal 220. This simple embodiment keeps the cost of the
25 set top terminal 220 low and limits the bandwidth necessary for the program control
26 information. Another simple embodiment uses a separate channel full-time (large
27 bandwidth) just for the menu information. This separate channel would facilitate the
28 rapid downloading of new graphics for the system and would enhance response time
29 when text and other data information needs to be changed.

30 In an embodiment, the basic building blocks or templates of the on-screen
31 menu displays will be stored in graphics memory consisting of nonvolatile RAM,

1 FLASH ROM, EPROM, or preferably, EEPROM, as shown as 620 in Figure 18a.
2 Referring to Figure 19, with the information from the graphics memory 620, the
3 microprocessor 602, graphics decompressor 622, a text generator (not shown in
4 Figure 19, but incorporated if necessary), and video combiner 624 will build a menu
5 screen.

6 The memory files of the graphics memory are preferably categorized into
7 three categories, background graphics 800, logo graphics 820, and menu and display
8 graphics 850, as shown in Figure 18a.

9 The background graphics file 800 will store menu backgrounds such as:
10 universal main menu backgrounds 804, universal submenu backgrounds 808, promo
11 backgrounds 812 and custom menu formats 816. The logo graphics file 820 will store
12 any necessary logos such as: Your Choice TV™ logos 824, Network logo files 828,
13 cable system logo files 832, studio logo files 836, and graphic elements file 840. The
14 menu display and cursor graphics file 850 will store menu display blocks 854 and
15 cursor highlight overlays 858, as well as any other miscellaneous files needed to build
16 the menus.

17 Using this method of storing menus discussed above, the menus can be
18 changed by reprogramming the graphics memory 620 of the set top terminal 220. To
19 revise the entire design of displayed menus, the network controller 214 or operations
20 center 202 instructs the EEPROM 620 to be erased and reprogrammed with new
21 menu templates. To change one menu format or logo, the network controller 214 or
22 operations center 202 instructs just the one location in memory to be erased and
23 rewritten. The menu reprogramming can also be done locally (at the set top terminal
24 220) by a serviceman.

25 As shown in Figure 18a, each memory subfile is further divided into various
26 memory blocks. For example, the background graphics file 800 contains the
27 universal main menu backgrounds 804. The universal main menu backgrounds
28 memory 804 includes memory units UM1 860, UM2 862 and UM3 863. Similarly,
29 the logo graphics file 820 and menu display and cursor graphics file 850 contain
30 individual subfile memory blocks (for example, studio logo file 836 has memory
31 block SL1 864; menu display blocks 854 has memory menu display block MD1 866).

1 Figure 18b shows the hierarchical storage of text transmitted from the cable
2 headend 208. Although text may be continuously transmitted with the video signals
3 to set top terminals 220, text may also be transmitted intermittently. In such a case,
4 the text is stored in the set top terminal 220. The text may be transmitted and stored
5 in a compressed format using known techniques. Additionally, the text may be stored
6 in the graphics memory 620 within the set top terminal 220.

7 Depending upon the use of the text, it will be stored in one of three portions
8 of memory. Information sent with the text will either direct the text to a particular
9 portion of memory, or include information as to the priority of text. The
10 microprocessor 602, part of the set top terminal hardware represented at block 880,
11 may then direct the text to the appropriate memory location for storage.

12 If the text is to be used frequently and over a long period of time a long term
13 storage 875 will be used. If the text will be used for a shorter period of time (for
14 example, a month), the text will be directed to an intermediate storage area 877. If
15 the text is to be used almost immediately, or for a short period of time (for example,
16 within a few days) the text is directed to a short term storage area 879. The
17 microprocessor 602 locates the appropriate text required for a particular menu and
18 retrieves it from the appropriate portion of memory 620. The text is output from the
19 graphics memory 620 to the text generator 621. Text generated from the text
20 generator 621 is thereafter directed to text/graphics video combiner 624.

21 Figure 18c shows the steps performed by the microprocessor 602 for creating
22 a menu based upon a series of overlay screens. These instructions are stored in
23 memory within the set top terminal 220 in a screen data file. The screens data file
24 instructs the microprocessor 602 on the location of each graphics file on the screen.
25 An example screen data file is shown in Table D, wherein the screen data file
26 specifies menu data positioning in terms of, for example, x- and y-pixel positions,
27 height and width, color codes and fonts. Alternatively, instructions or routines may
28 be transmitted from the operations center 202 to be stored in memory within the
29 individual set top terminals 220.

1 TABLE D

2	~ The following data lines are for the main menu										
3	~										
4	~		Screen Type	Template File		Description					
5	SCREEN		`@MAIN	`main menu.pcx		`Main Menu					
6	~										
7	~ Justify		X Y Ht Wd	FColor BColor		Font					
8	STR POS	`Left	`165 `85	`30	`300	`27	`55	FUTUR14.GFT			
9	STRING `MAIN MENU										
10	~										
11	~ Justify		X Y Hght Wdt								
12	PCX POS	`LEFT	`190 `75	`200	`200						
13	PCX example.pcs										
14	~										
15	~ Justify		X Y Ht Wd FColor BColor Font	X Y							
16	Ht							Wd			
17	ITEM POS	`Left	`120 `100 `20 `400	`15	`25	FUTUR12.GFT	`110				
18			`90 `30					`420			
19	ITEM`@YCTV`YOUR CHOICE TV										
20	~										
21	~ Justify		X Y Ht Wd FColor BColor Font	X Y							
22	Ht							Wd			
23	ITEM POS	`Left	`120 `200 `20 `400	`15	`25	FUTUR12.GFT	`110				
24			`190 `30					`420			
25	ITEM `@PPV`PAY-PER-VIEW HIT MOVIES										

26 As shown at block 878 in Figure 18c, initially the microprocessor 602
 27 instructs the tuner 603 to select a channel. The channel is decompressed, error
 28 corrected and decrypted, if necessary. If the video is to be reduced in size, so as to
 29 be placed within a video window, or is a split screen video window which must be
 30 enlarged, the video is scaled to the appropriate size. Additionally, the video may be
 31 required to be redirected to a portion of the television screen, accomplished by
 32 creating a series of offsets for each pixel location of the video.

33 Graphics may also be used to create a menu in most instances. As
 34 shown in block 882, the microprocessor 602 may fetch a background file, a logo file,
 35 and a menu display and cursor file in most instances. Each of these files is
 36 decompressed 883, and then combined, block 886.

37 Similarly, the microprocessor 602 may fetch text, as shown in block 884.
 38 Depending upon the memory location of the text, the microprocessor 602 will fetch
 39 the text from long-term, intermediate-term, or short-term storage, as described above.

1 Based upon this memory retrieval, the text is generated, block 885, and combined
2 with the video (if any), with as many screens of a decompressed graphics as are
3 necessary, and any text, block 886. The image or portions of the image are stored in
4 the video combiner (for example, combiner 624 of Figure 19) until all overlays are
5 received. Thereafter, the entire image is sent, under direction of another routine, to
6 be displayed on the television screen, as represented by display block 888.

7 The terms and descriptions used herein are set forth by way of
8 illustration only and are not meant as limitations. Those skilled in the art will
9 recognize that numerous variations are possible within the spirit and scope of the
10 invention as defined in the following claims.

CLAIMS

What is claimed is:

1. An apparatus that provides digital broadcast television programs to a subscriber, comprising;

a receiver module that receives program data and a local authorization code, wherein the authorization code allows the digital broadcast television programs to be decrypted for viewing;

a transmitter that sends a program selection to a remote site, wherein the program selection is made from the program data; and

a memory coupled to the receiver module, the memory storing the received authorization code until needed for decrypting the selected program, wherein when the program selection is received at the remote site, the remote site sends the local authorization code.

2. The apparatus of claim 1, further comprising a processor that processes the received local authorization code to decrypt the digital broadcast television programs, wherein the receiver module includes a first receiver and a second receiver.

3. The apparatus of claim 2, wherein the receiver module, the processor, the transmitter and the memory are contained in a set top terminal operably connected to a television, wherein the receiver module receives the digital broadcast television programs, and wherein when decrypted, the selected program is viewed on the television.

4. The apparatus of claim 3, wherein the television is an analog television, and wherein the set top terminal converts digital programs to analog programs for display on the analog television.

5. The apparatus of claim 2, wherein the first receiver, the transmitter, and the processor are contained on a smart card incorporated into a digital television.

6. The apparatus of claim 5, wherein the second receiver is incorporated into the digital television, wherein the second receiver receives the digital broadcast television programs, and wherein the digital television displays the selected broadcast television program.

1 7. The apparatus of claim 2, wherein the receiver module, the processor,
2 the transmitter, and the memory are contained on a smart card incorporated into a
3 digital television, and wherein the digital television comprises a third receiver that
4 receives the digital broadcast television programs.

5 8. The apparatus of claim 7, wherein the digital television further
6 comprises a demultiplexer that demultiplexes the received digital broadcast television
7 programs.

8 9. The apparatus of claim 2, wherein the first receiver, the processor and
9 the transmitter are incorporated in a personal computer, and wherein the program data
10 are displayed on a display of the personal computer.

11 10. The apparatus of claim 9, wherein the second receiver and the memory
12 are incorporated into a digital television, wherein the second receiver receives the
13 digital television programs and the local authorization code, the digital television
14 comprising a processor that processes the received local authorization code to decrypt
15 the digital broadcast television programs.

16 11. The apparatus of claim 9, wherein the personal computer comprises a
17 connector that couples the personal computer to a digital television, the second
18 receiver and the memory are incorporated into the digital television, the second
19 receiver receives the digital broadcast television programs, and wherein the first
20 receiver receives the local authorization code and the personal computer sends the
21 local authorization code to the digital television, the digital television comprising a
22 processor that processes the received local authorization code to decrypt the digital
23 broadcast television programs.

24 12. The apparatus of claim 11, wherein the connector is one of a radio
25 frequency connector, an infra red connector and a wired connector.

26 13. The apparatus of claim 12, wherein the wired connector comprises RS-
27 232 connections and an RS-232 cable.

28 14. The apparatus of claim 1, wherein the transmitter comprises one of a
29 telephone modem, a cable modem, a wireless modem, an asymmetric digital
30 subscriber line connector, an integrated services digital network connector, T1 and

1 T3 lines, a fiber optic connector, a local area net connector and a satellite antenna
2 connector.

3 15. The apparatus of claim 1, further comprising a broadcast interface that
4 receives the digital broadcast television programs, wherein the broadcast interface
5 comprises one of a radio frequency connector, a telephone modem, a cable modem,
6 a wireless modem, an asymmetric digital subscriber line connector, an integrated
7 digital services network connector, T1 and T3 lines, a fiber optic connector, and a
8 local area net connector and a satellite antenna connector.

9 16. The apparatus of claim 1, further comprising a demultiplexer, wherein
10 the digital broadcast television programs are multiplexed with the local authorization
11 code, and wherein the demultiplexer demultiplexes the local authorization code and
12 the digital broadcast television programs.

13 17. The apparatus of claim 1, wherein the program data is program guide
14 data, further comprising a remote control, wherein the remote control sends
15 commands to scroll the program guide data and to select a desired program for
16 viewing.

17 18. The apparatus of claim 17, wherein the remote control is one of a wired
18 control, an infra red control, a radio frequency control, and a laser control.

19 19. The apparatus of claim 1, wherein the digital broadcast television
20 programs are provided over a cable television network.

21 20. The apparatus of claim 1, wherein the digital broadcast television
22 programs are provided via over-the-air broadcast.

23 21. The apparatus of claim 20, wherein the over-the-air broadcast is
24 provided from a national broadcaster.

25 22. The apparatus of claim 20, wherein the over-the-air broadcast is
26 provided from a broadcast affiliate.

27 23. The apparatus of claim 1, wherein the digital broadcast television
28 programs are provided via satellite broadcast.

29 24. The apparatus of claim 1, wherein the remote site includes one of a local
30 cable system, a broadcast affiliate and a national broadcaster.

- 1 25. The apparatus of claim 24, wherein the transmitter sends the program
- 2 selection to a local cable system, the local cable system returning the local
- 3 authorization code.
- 4 26. The apparatus of claim 25, wherein the local authorization code is
- 5 multiplexed with the digital broadcast television programs.
- 6 27. The apparatus of claim 24, wherein the transmitter sends the program
- 7 selection to a broadcast affiliate, the broadcast affiliate returning the local
- 8 authorization code.
- 9 28. The apparatus of claim 27, wherein the local authorization code is
- 10 multiplexed with the digital broadcast television programs.
- 11 29. The apparatus of claim 24, wherein the transmitter sends the program
- 12 selection to a national broadcaster, the national broadcaster returning the local
- 13 authorization code.
- 14 30. The apparatus of claim 29, wherein the local authorization code is
- 15 multiplexed with the digital broadcast television programs.
- 16 31. The apparatus of claim 24, wherein the remote site comprises an order
- 17 and authorization system, the order and authorization system receiving the program
- 18 selection and generating an authorization signal, the authorization signal providing
- 19 the local authorization code.
- 20 32. The apparatus of claim 31, wherein the order and authorization system
- 21 is colocated with one of the local cable company, the broadcast affiliate and the
- 22 national broadcaster.
- 23 33. The apparatus of claim 31, wherein the order and authorization system
- 24 includes a billing system, the billing system receiving the authorization request and
- 25 generating a billing record.
- 26 34. The apparatus of claim 33, wherein the billing record debits a
- 27 subscriber's account.
- 28 35. The apparatus of claim 33, wherein the billing system send the billing
- 29 record to a subscriber for payment.
- 30 36. The apparatus of claim 33, wherein the billing system charges a
- 31 subscriber's credit card account.

1 37. The apparatus of claim 1, wherein the remote site comprises a web page
2 of an Internet, wherein the web page includes the program data and generates an
3 authorization request.

4 38. The apparatus of claim 37, wherein the remote site further comprises an
5 order and authorization system coupled to the web page, the order and authorization
6 system receiving the authorization request and generating an authorization signal, the
7 authorization signal providing the local authorization code.

8 39. The apparatus of claim 38, wherein the order and authorization system
9 includes a billing system, the billing system receiving the authorization request and
10 generating a billing record.

11 40. The apparatus of claim 1, wherein the local authorization code,
12 comprises:

13 an identification code; and

14 an address; and

15 one or more program identifiers, wherein the identification code
16 uniquely identifies the apparatus receiving program access authorization, the address
17 identifies the geographical location of the apparatus and routing instructions, and the
18 one or more program identifiers specify the digital broadcast television programs that
19 are authorized for viewing.

20 41. The apparatus of claim 1, wherein the program selection comprises an
21 event, the apparatus receiving authorization for a single display of the event.

22 42. The apparatus of claim 1, wherein the program selection comprises an
23 event, the apparatus receiving authorization for multiple displays of the event.

24 43. The apparatus of claim 1, wherein the program selection comprises a
25 subscription.

26 44. The apparatus of claim 43, wherein the subscription is for a speciality
27 channel.

28 45. The apparatus of claim 44, wherein the speciality channel is a first-run
29 movie channel.

30 46. The apparatus of claim 44, wherein the speciality channel is a high
31 definition television channel.

- 1 47. The apparatus of claim 43, wherein the subscription is for a speciality
- 2 program.
- 3 48. The apparatus of claim 47, wherein the speciality program is a series of
- 4 sporting events.
- 5 49. The apparatus of claim 1, wherein the program data comprises a menu
- 6 of available programs.
- 7 50. The apparatus of claim 49, wherein the menu is a barker channel, the
- 8 barker channel displaying programs and date/time of broadcast.
- 9 51. The apparatus of claim 49, wherein the menu is a list of available
- 10 programs.
- 11 52. The apparatus of claim 49, wherein the menu includes program rating,
- 12 year of production, and program biographical data.
- 13 53. The apparatus of claim 52, wherein the biographical data includes a list
- 14 of actors and a program summary.
- 15 54. The apparatus of claim 49, wherein the menu includes a hypertext link
- 16 to a web site on an Internet.
- 17 55. The apparatus of claim 49, wherein the menu is displayed in a picture-
- 18 in-picture format with a display of the program selection.
- 19 56. The apparatus of claim 49, wherein the menu includes submenus.
- 20 57. The apparatus of claim 56, wherein the submenus include a program
- 21 selection confirmation submenu and a program description submenu.
- 22 58. The apparatus of claim 49, wherein the menu includes overlay menus
- 23 and hidden menus.
- 24 59. The apparatus of claim 1, wherein the menu is displayed on a web page
- 25 of an Internet, the web page including a home page and additional pages , the home
- 26 page and the additional pages accessible by operation of forward, back and home
- 27 buttons.
- 28 60. The apparatus of claim 1, wherein the program selection includes a time
- 29 out feature, the time out feature sending a cancel program order that deauthorizes
- 30 display of the program selection and prevents a charge for the selected program.

- 1 61. The apparatus of claim 60, wherein the time out feature is in effect prior
- 2 to the display of the program selection, and for five minutes thereafter.
- 3 62. The apparatus of claim 1, wherein the program data is provided in a
- 4 hard-copy format, the hard copy format including event codes and program
- 5 identifiers.
- 6 63. The apparatus of claim 62, wherein the event codes and program
- 7 identifiers are entered into the apparatus to send the program selection.
- 8 64. The apparatus of claim 63, wherein the event codes and program
- 9 identifiers are entered into the apparatus by operation of a remote control coupled to
- 10 the apparatus.
- 11 65. The apparatus of claim 63, wherein the event codes and program
- 12 identifiers are entered into the apparatus by operation of a soft key board displayed
- 13 on a television display, the television display coupled to the apparatus.
- 14 66. The apparatus of claim 63, wherein the event codes and program
- 15 identifiers are entered into the apparatus by operation of a key board coupled to a
- 16 personal computer.
- 17 67. An apparatus that provides digital broadcast television program
- 18 ordering, comprising:
 - 19 an order and authorization system that receives a program order for a
 - 20 terminal in a television distribution network and generates an authorization order that
 - 21 authorizes access to a program; and
 - 22 a broadcaster coupled to the order and authorization system that sends
 - 23 the program to the terminal, wherein the program is multiplexed with other digital
 - 24 broadcast television programs, wherein the broadcaster receives the authorization
 - 25 signal, the authorization signal providing a local authorization code addressed to the
 - 26 terminal, the local authorization code allowing the terminal to demultiplex, decrypt
 - 27 and display the program.
- 28 68. The apparatus of claim 67, wherein the local authorization signal is
- 29 multiplexed with the digital broadcast television programs, and wherein the terminal
- 30 demultiplexes the local authorization code to access the program.

1 69. The apparatus of claim 67, wherein the local authorization code is
2 transmitted by the order and authorization system to the terminal.

3 70. The apparatus of claim 67, wherein the program is listed in a program
4 guide.

5 71. The apparatus of claim 70, wherein the program guide is an electronic
6 program guide.

7 72. The apparatus of claim 71, wherein the electronic program guide is
8 provided on a web page on an Internet, and wherein the terminal accesses the web
9 page to receive the electronic program guide.

10 73. The apparatus of claim 71, wherein the electronic program guide is
11 broadcast to the terminal by the broadcaster.

12 74. The apparatus of claim 71, wherein the electronic program guide is in
13 a format of a barker channel showing program selections and time/date of broadcast.

14 75. The apparatus of claim 71, wherein the electronic program guide is a list
15 of available programs, the list capable of being scrolled to show all available
16 programs.

17 76. The apparatus of claim 67, wherein the program is one of a single event,
18 a multiple event and a subscription.

19 77. The apparatus of claim 76, wherein the local authorization code provides
20 access to the single event on multiple occasions.

21 78. The apparatus of claim 76, wherein the subscription includes a speciality
22 channel subscription and a speciality program subscription.

23 79. The apparatus of claim 78, wherein the speciality channel subscription
24 includes monthly and annual subscriptions.

25 80. The apparatus of claim 78, wherein the speciality channel subscription
26 is a first-run movie channel subscription.

27 81. The apparatus of claim 78, wherein the speciality program subscription
28 is a sporting event subscription.

29 82. The apparatus of claim 78, wherein the sporting event subscription
30 includes a full season subscription and a partial season subscription.

- 1 83. The apparatus of claim 81, wherein the sporting event subscription
- 2 includes a favorite team subscription.
- 3 84. The apparatus of claim 67, further comprising a billing system coupled
- 4 to the order and authorization system, the billing system receiving the program order
- 5 and generating a billing record.
- 6 85. The apparatus of claim 84, wherein the billing record is used to debit a
- 7 cash card included in the terminal, the billing system sending a debit signal
- 8 corresponding to the billing record to the terminal.
- 9 86. The apparatus of claim 67, wherein the order and authorization system
- 10 includes a time out feature that allows cancellation of the program order without
- 11 incurring a charge, the time out feature effective for a time prior to a start of the
- 12 program and for a time after the start of the program.
- 13 87. The apparatus of claim 86, wherein the time after start of the program
- 14 is five minutes.
- 15 88. The apparatus of claim 67, wherein the broadcaster is a national
- 16 broadcaster.
- 17 89. The apparatus of claim 67, wherein the broadcaster is a broadcast
- 18 affiliate.
- 19 90. The apparatus of claim 67, wherein the broadcaster is a local cable
- 20 company.
- 21 91. The apparatus of claim 67, wherein the broadcaster is a digital satellite
- 22 broadcaster.
- 23 92. The apparatus of claim 67, wherein the digital broadcast television
- 24 programs are provided over-the-air.
- 25 93. The apparatus of claim 67, wherein the digital broadcast television
- 26 programs are provided over a cable television system.
- 27 94. The apparatus of claim 67, wherein the digital broadcast television
- 28 programs are provided over a satellite system.
- 29 95. The apparatus of claim 67, wherein the order and authorization system
- 30 and the broadcaster are colocated.

1 96. The apparatus of claim 67, wherein the order and authorization system
2 and the broadcaster are colocated with a billing system.

3 97. The apparatus of claim 67, wherein the local authorization code includes
4 a terminal address, a routing indicator, and a terminal identifier.

5 98. The apparatus of claim 97, wherein the local authorization code further
6 includes an event identifier and a program identifier, the event identifier indicating
7 a time and date of broadcast, the program identifier uniquely identifying the program.

8 99. A method for providing broadcast television digital programming,
9 comprising:

10 generating program data related to the digital programming;

11 providing the program data;

12 displaying the program data as a program menu;

13 receiving a program order, the program order designating one or more
14 programs for viewing;

15 sending a program authorization; and

16 broadcasting the digital programming, wherein the program
17 authorization provides access to the one or more programs designated by the program
18 order.

19 100. The method of claim 99, wherein the digital programming and the
20 programming data are broadcast over-the-air.

21 101. The method of claim 99, wherein the digital programming and the
22 program data are broadcast over a cable television system.

23 102. The method of claim 99, wherein the digital programming is broadcast
24 over-the-air and the program data is provided on an Internet web site.

25 103. The method of claim 99, wherein the digital programming is broadcast
26 over a cable television system and the program data is provided on an Internet web
27 page.

28 104. The method of claim 99, wherein the program order is received at a
29 remote location.

30 105. The method of claim 104, wherein the remote location is an order and
31 authorization system.

- 1 106. The method of claim 104, wherein the remote location is an Internet web
- 2 page.
- 3 107. The method of claim 104, wherein the remote location is a digital
- 4 program broadcaster.
- 5 108. The method of claim 107, wherein the digital program broadcaster is one
- 6 of a national broadcaster, a broadcast affiliate, a satellite broadcaster and a cable
- 7 broadcaster.
- 8 109. The method of claim 108, wherein the digital program broadcaster is co-
- 9 located with an order and authorization system.
- 10 110. The method of claim 99, wherein the program data is provided to a
- 11 terminal in a digital broadcast television environment.
- 12 111. The method of claim 99, further comprising sending the program
- 13 authorization from a remote location to a digital programming broadcaster.
- 14 112. The method of claim 111, wherein the remote location is an Internet web
- 15 page.
- 16 113. The method of claim 99, wherein the program authorization includes a
- 17 local authorization code addressed to a terminal in a digital broadcast television
- 18 environment, and wherein the sending step comprises multiplexing the program
- 19 authorization with the digital programming.
- 20 114. The method of claim 99, wherein the program authorization includes a
- 21 local authorization code addressed to a terminal in a digital broadcast television
- 22 environment, and wherein the sending step comprises sending the local authorization
- 23 code to a terminal in a digital broadcast television environment.
- 24 115. The method of claim 99, further comprising:
25 waiting for a time out period to determine if a cancel order signal has
26 been received, and if the cancel order signal is not received in the time out period:
27 sending the program order to a billing system, and
28 preparing a billing record.
- 29 116. The method of claim 99, further comprising:
30 waiting for a time out period to determine if a cancel order signal has
31 been received, and if the cancel order signal is received in the time out period:

generating a deauthorization signal; and
transmitting the deauthorization signal, wherein the deauthorization signal removes access to a previously authorized program.

117. The method of claim 99, wherein the one or more programs include one of a single event, a multiple event and a subscription.

118. The method of claim 117, wherein the local authorization code provides access to the single event on multiple occasions.

119. The method of claim 117, wherein the subscription includes a speciality channel subscription and a speciality program subscription.

120. The method of claim 119, wherein the speciality channel subscription includes monthly and annual subscriptions.

121. The method of claim 119, wherein the speciality channel subscription is a first-run movie channel subscription.

122. The method of claim 119, wherein the speciality program subscription is a sporting event subscription.

123. The method of claim 119, wherein the sporting event subscription includes a full season subscription and a partial season subscription.

124. The method of claim 123, wherein the sporting event subscription includes a favorite team subscription.

125. The method of claim 99, wherein the order and authorization system includes a billing system, the billing system receiving the program order and generating a billing record.

126. The method of claim 125, further comprising sending a debit signal corresponding to the billing record to a terminal, the debit signal debiting a cash card in the terminal.

127. A method for providing digital broadcast programming to a terminal in a television network, comprising:
receiving a program order from the terminal;
generating an authorization signal;
sending the authorization signal to the terminal;

1 broadcasting the program, wherein the program is multiplexed with
2 other digital programs and wherein the authorization signal received by the terminal
3 provides a code that the terminal uses to decrypt the program.

4 128. The method of claim 127, wherein the authorization signal is
5 multiplexed with the other digital programs, the terminal demultiplexing the
6 authorization signal and the digital programs.

7 129. The method of claim 127, wherein a remote site transmits the
8 authorization signal and a broadcaster broadcasts the multiplexed digital programs.

9 130. The method of claim 129, wherein the remote site is an order and
10 authorization system.

11 131. The method of claim 130, wherein the order and authorization system
12 is colocated with the broadcaster.

13 132. The method of claim 131, wherein the remote site is an Internet web site.

14 133. The method of claim 129, wherein the broadcaster is one of a national
15 broadcaster, a broadcast affiliate, a satellite broadcaster and a cable broadcaster.

16 134. The method of claim 127, wherein the multiplexed digital programs are
17 broadcast over-the-air.

18 135. The method of claim 127, wherein the multiplexed digital programs are
19 broadcast over a cable television cable.

20 136. The method of claim 127, wherein the multiplexed digital programs are
21 broadcast over a satellite system.

22 137. The method of claim 127, further comprising:

23 generating a program guide; and

24 transmitting the program guide, wherein program selections are made
25 based on the program guide.

26 138. The method of claim 137, wherein the program guide is broadcast to the
27 terminal.

28 139. The method of claim 137, wherein the program guide is provided at an
29 Internet web site.

30 140. The method of claim 127, wherein the digital programs include high
31 definition television programs and standard definition television programs.

1 141. The method of claim 127, further comprising:
2 generating a billing record corresponding to the program order; and
3 charging an account of a subscriber who initiated the program order.

4 142. A method for providing digital broadcast programming to a first
5 terminal in a television network, comprising:
6 receiving a program order from a second terminal;
7 generating an authorization code;
8 sending the authorization code to the first terminal;
9 broadcasting the program, wherein the program is multiplexed with
10 other digital programs and wherein the authorization code received by the first
11 terminal provides a code that the first terminal uses to decrypt the program.

12 143. The method of claim 142, wherein the authorization code is multiplexed
13 with the other digital programs, the first terminal demultiplexing the authorization
14 signal and the digital programs.

15 144. The method of claim 142, wherein a remote site transmits the
16 authorization code and a broadcaster broadcasts the multiplexed digital programs.

17 145. The method of claim 144, wherein the remote site is an order and
18 authorization system.

19 146. The method of claim 145, wherein the order and authorization system
20 is a network controller.

21 147. The method of claim 145, wherein the order and authorization system
22 is collocated with the broadcaster.

23 148. The method of claim 145, wherein the remote site is an Internet web site.

24 149. The method of claim 144, wherein the broadcaster is one of a national
25 broadcaster, a broadcast affiliate, a satellite broadcaster and a cable broadcaster.

26 150. The method of claim 144, wherein the remote site gathers programs
27 watched information.

28 151. A method for providing multiple digital broadcast programs to a
29 terminal in a television network, comprising:
30 receiving a program order, wherein the program order requests access
31 to more than one program being broadcast simultaneously;

- 1 generating an authorization signal;
- 2 sending the authorization signal to the terminal;
- 3 broadcasting the programs, wherein the programs are multiplexed with
- 4 other digital programs and wherein the authorization signal received by the terminal
- 5 provides a code that the terminal uses to decrypt the more than one programs.

6 152. The method of claim 151, wherein the authorization signal is
7 multiplexed with the other digital programs, the terminal demultiplexing the
8 authorization signal and the more than one programs authorized for viewing by the
9 authorization code.

10 153. The method of claim 151, wherein a remote site transmits the
11 authorization signal and a broadcaster broadcasts the multiplexed digital programs.

12 154. The method of claim 153, wherein the remote site is an order and
13 authorization system.

14 155. The method of claim 154, wherein the order and authorization system
15 is collocated with the broadcaster.

16 156. The method of claim 155, wherein the remote site is an Internet web site.

17 157. The method of claim 153, wherein the broadcaster is one of a national
18 broadcaster, a broadcast affiliate, a satellite broadcaster and a cable broadcaster.

19 158. The method of claim 157, further comprising:

20 gathering subscriber specific data for a subscriber;

generating subscriber specific menu data, based on the subscriber specific data; and

23 providing a subscriber specific menu, based on the subscriber specific
24 menu data, for viewing.

25 159. The method of claim 158, wherein the subscriber specific data includes
26 one of programs watched data, demographic data and subscriber queries.

27 160. The method of claim 159, wherein the terminal gathers the programs
28 watched data, based on programs played on the terminal.

29 161. The method of claim 159, wherein the terminal transmits the gathered
30 programs watched data to a remote location.

1 162. The method of claim 161, wherein the location is one of a national
2 broadcaster, a broadcast affiliate, and a local cable system.

3 163. The method of claim 162, wherein the terminal transmits the gathered
4 programs watched data via one of an asymmetric digital subscriber line, an integrated
5 digital services network line, T1 and T3 lines, a cable modem, a telephone modem,
6 a wireless modem, a local area network, and a fiber optic cable.

7 164. The method of claim 158, wherein the programs watched data is
8 gathered by one of the national broadcaster, the broadcast affiliate and the local cable
9 system.

10 165. The method of claim 158, wherein the subscriber specific menu is
11 provided at an Internet web site.

12 166. The method of claim 165, wherein the specific subscriber is identified
13 by one of an ANI, a cookie, an Internet address, a user name and a user identification.

14 167. The method of claim 158, wherein the subscriber specific menu is
15 provided with a multiplexed program signal.

16 168. The method of claim 158, wherein the subscriber specific menu is
17 provided out of band.

18 169. A system that provides digital broadcast television program ordering,
19 comprising:

20 a processor that receives a program order for a terminal in a television
21 distribution network and generates an authorization order that authorizes access to
22 a program; and

23 a broadcaster coupled to the processor that receives the authorization
24 signal and sends the program to the terminal, wherein the program is multiplexed
25 with other digital broadcast television programs, and wherein the authorization signal
26 provides a local authorization code addressed to the terminal, the local authorization
27 code allowing the terminal to demultiplex, decrypt and display the program.

28 170. The system of claim 169, wherein the local authorization code is
29 multiplexed with the digital broadcast television programs, and wherein the terminal
30 demultiplexes the local authorization code to access the program.

- 1 171. The system of claim 169, wherein the local authorization code is
- 2 transmitted by the processor to the terminal.
- 3 172. The system of claim 169, wherein the program is listed in a program
- 4 guide.
- 5 173. The system of claim 172, wherein the program guide is an electronic
- 6 program guide.
- 7 174. The system of claim 173, wherein the electronic program guide is
- 8 provided on a web page on an Internet, and wherein the terminal accesses the web
- 9 page to receive the electronic program guide.
- 10 175. The system of claim 173, wherein the electronic program guide is
- 11 broadcast to the terminal by the broadcaster.
- 12 176. The system of claim 173, wherein the electronic program guide is in a
- 13 format of a barker channel showing program selections and time/date of broadcast.
- 14 177. The system of claim 173, wherein the electronic program guide is a list
- 15 of available programs, the list capable of being scrolled to show available programs.
- 16 178. The system of claim 169, wherein the program is listed in a menu.
- 17 179. The system of claim 169, wherein the processor gathers subscriber
- 18 specific data for a subscriber, generates subscriber specific menu data, based on the
- 19 subscriber specific data and provides a subscriber specific menu, based on the
- 20 subscriber specific menu data, for viewing.
- 21 180. The system of claim 179, wherein the subscriber specific data includes
- 22 one of programs watched data, demographic data and subscriber queries.
- 23 181. The system of claim 180, wherein the programs watched data is based
- 24 on programs played on the terminal.
- 25 182. The system of claim 180, wherein the programs watched data is based
- 26 on program orders received at the processor.
- 27 183. The system of claim 179, wherein the subscriber specific menu is
- 28 provided at an Internet web site.
- 29 184. The system of claim 183, wherein the specific subscriber is identified
- 30 by one of an ANI, a cookie, a user identification, a user name, and an Internet
- 31 address.

1 185. The system of claim 179, wherein the subscriber specific menu is
2 provided with a multiplexed program signal.

3 186. The system of claim 179, wherein the subscriber specific menu is
4 provided out of band.

5 187. The system of claim 169, wherein the terminal gathers subscriber
6 specific data for a subscriber.

7 188. The system of claim 187, wherein the subscriber specific data includes
8 one of programs watched data and subscriber queries.

9 189. The system of claim 188, wherein the subscriber specific data is
10 provided to a remote location.

11 190. The system of claim 189, wherein the remote location includes the
12 processor.

13 191. The system of claim 190, wherein the remote location is one of a
14 national broadcaster, a broadcast affiliate, and a local cable system.

15 192. The system of claim 190, wherein the processor generates subscriber
16 specific menu data, based on the subscriber specific data, and provides a subscriber
17 specific menu, based on the subscriber specific menu data, for viewing.

18 193. The system of claim 189, wherein the subscriber specific menu is
19 provided at an Internet web site.

20 194. The system of claim 193, wherein the specific subscriber is identified
21 by one of an ANI, a cookie, an Internet address, a user name, and a user
22 identification.

23 195. The system of claim 193, wherein the specific subscriber is identified
24 by subscriber-provided data.

25 196. The system of claim 189, wherein the subscriber specific menu is
26 provided with a multiplexed program signal.

27 197. The system of claim 189, wherein the subscriber specific menu is
28 provided out of band.

29 198. The system of claim 187, wherein the terminal transmits the gathered
30 subscriber specific data via one of an asymmetric digital subscriber line, an integrated
31 digital services network line, T1 and T3 lines, a cable modem, a telephone modem,
32 a wireless modem, a local area network, and a fiber optic cable.

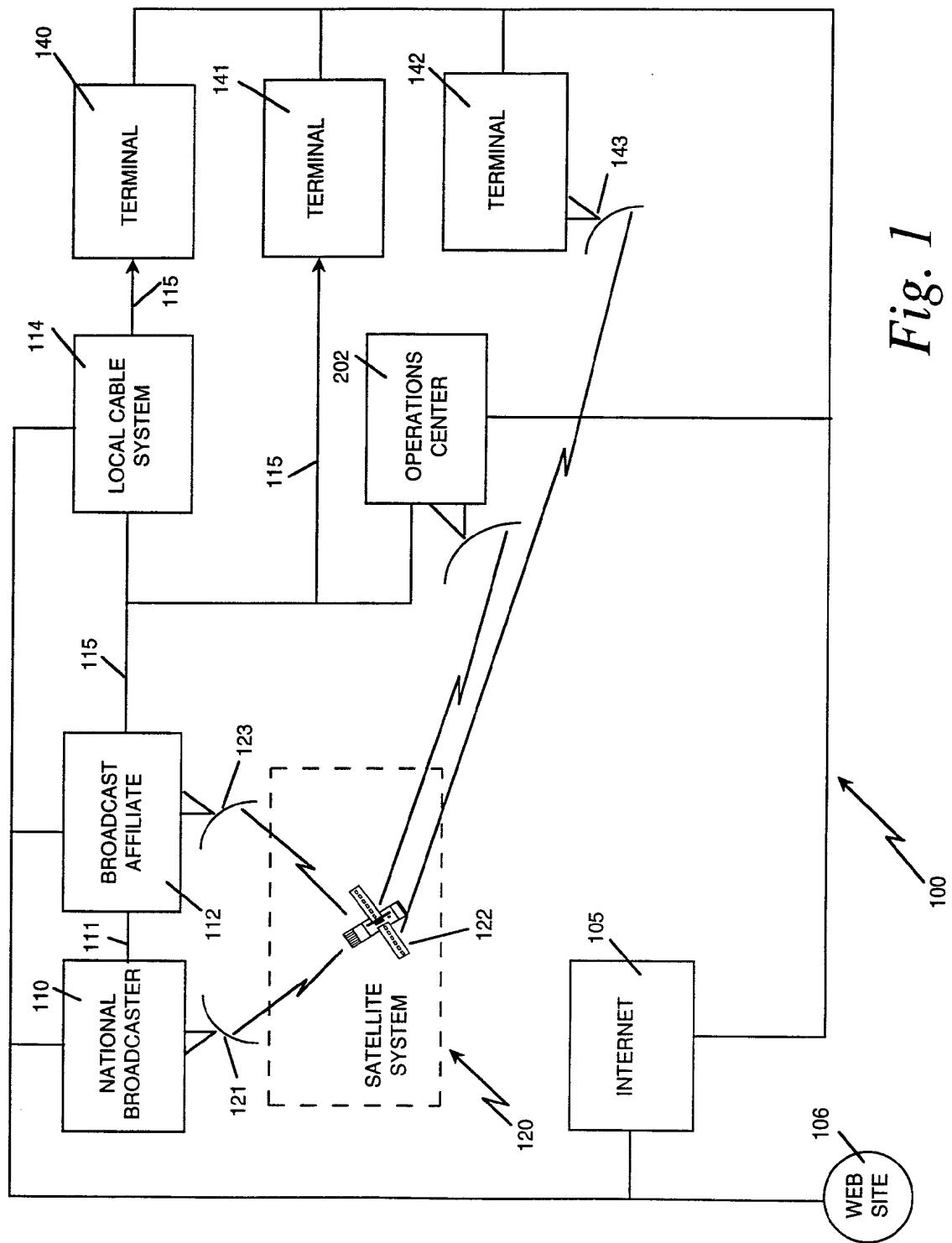


Fig. 1

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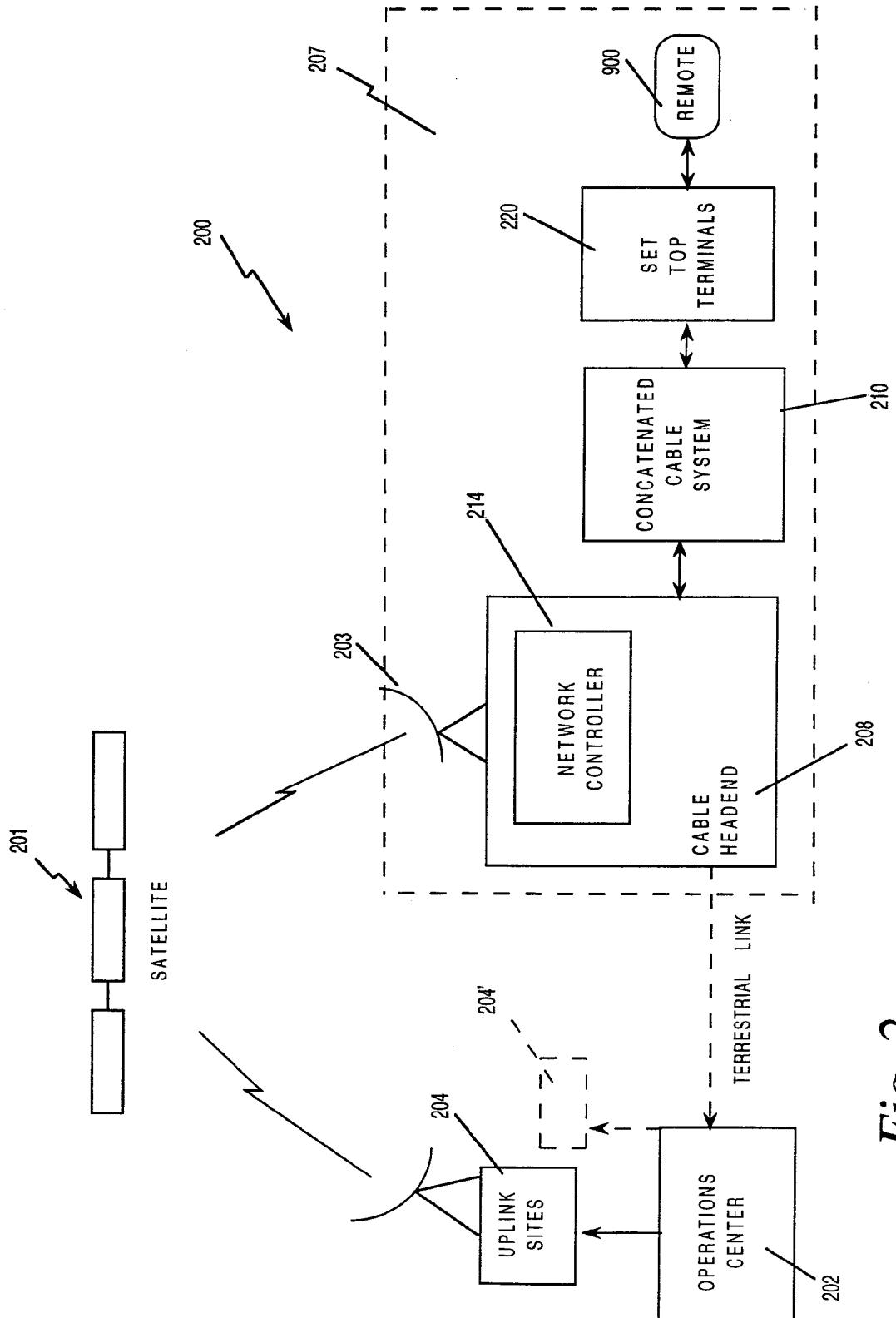


Fig. 2

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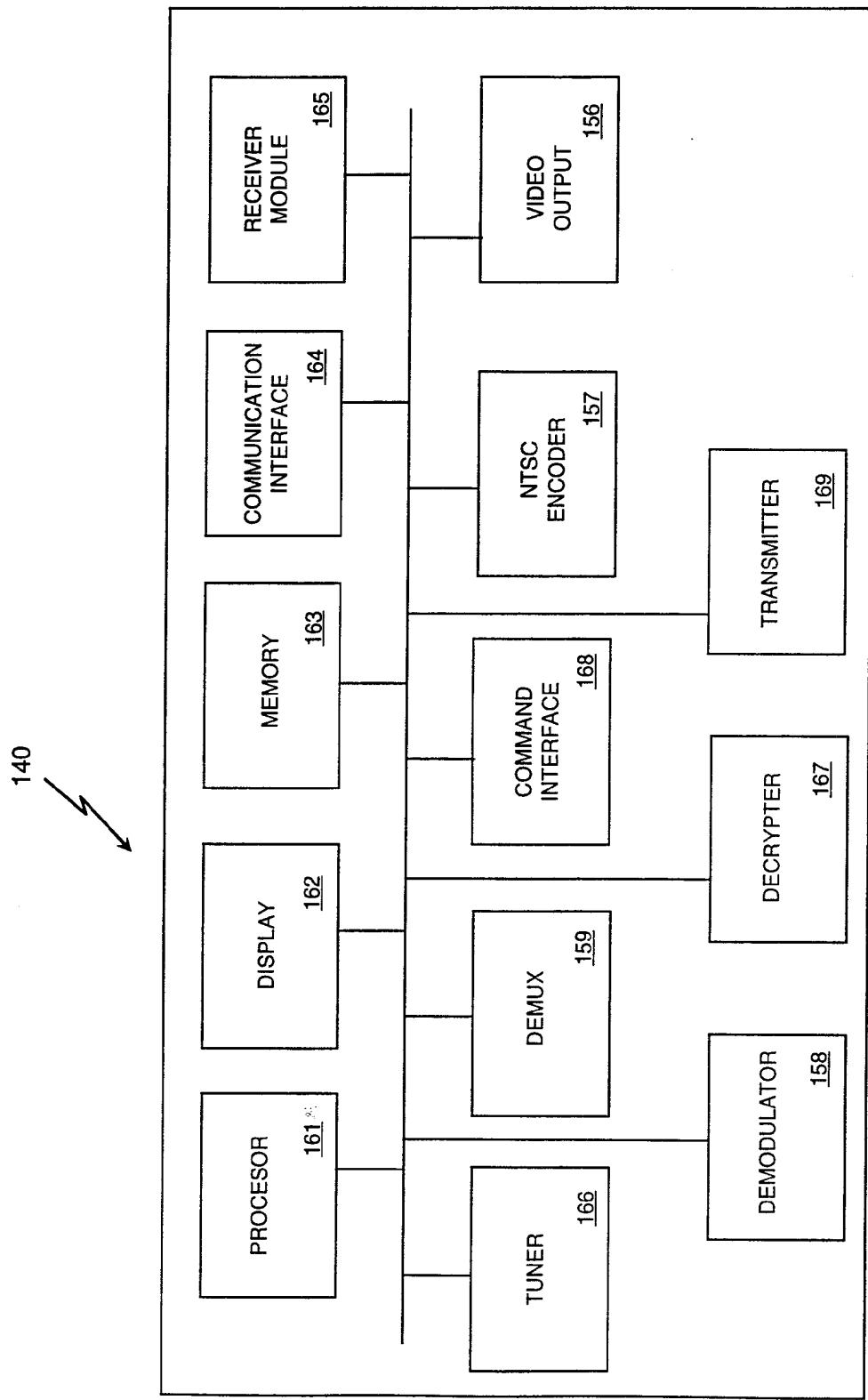
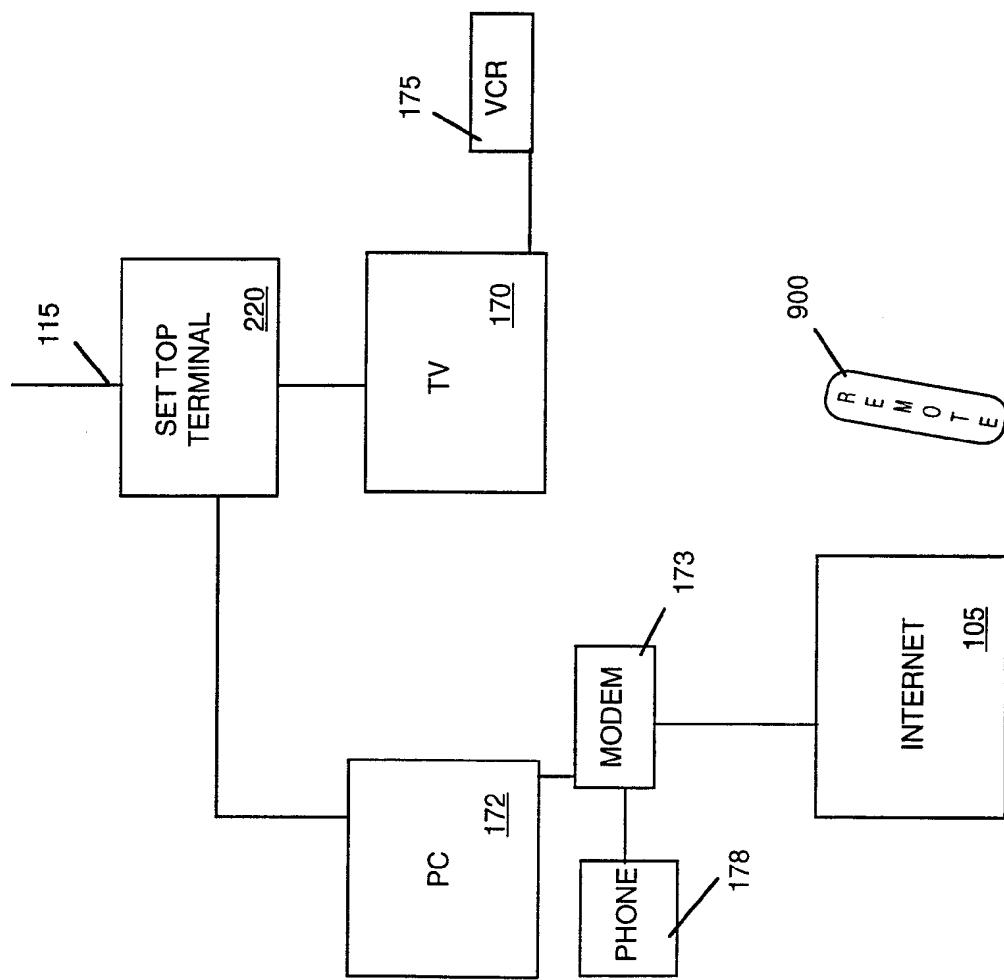


Fig. 3

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Fig. 4a



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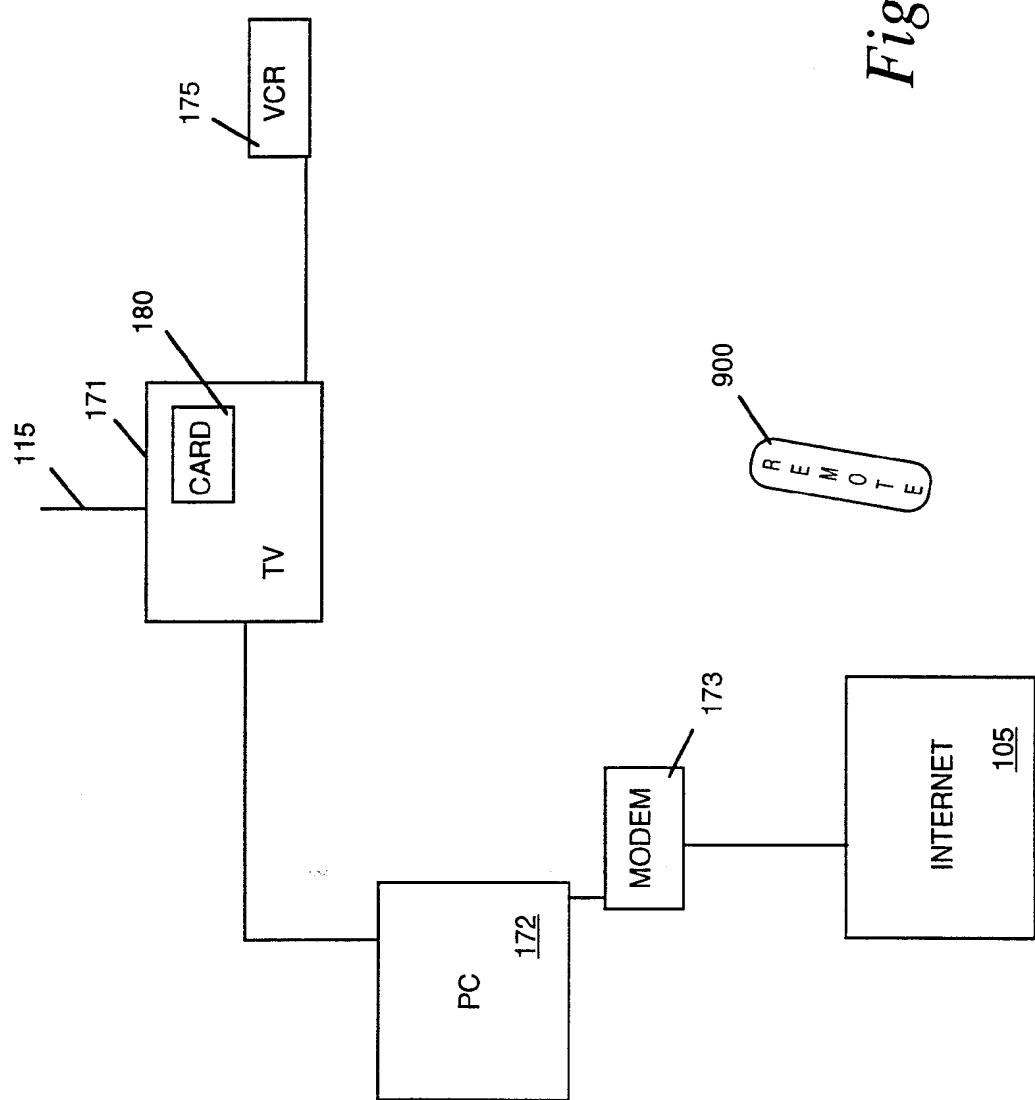


Fig. 4b

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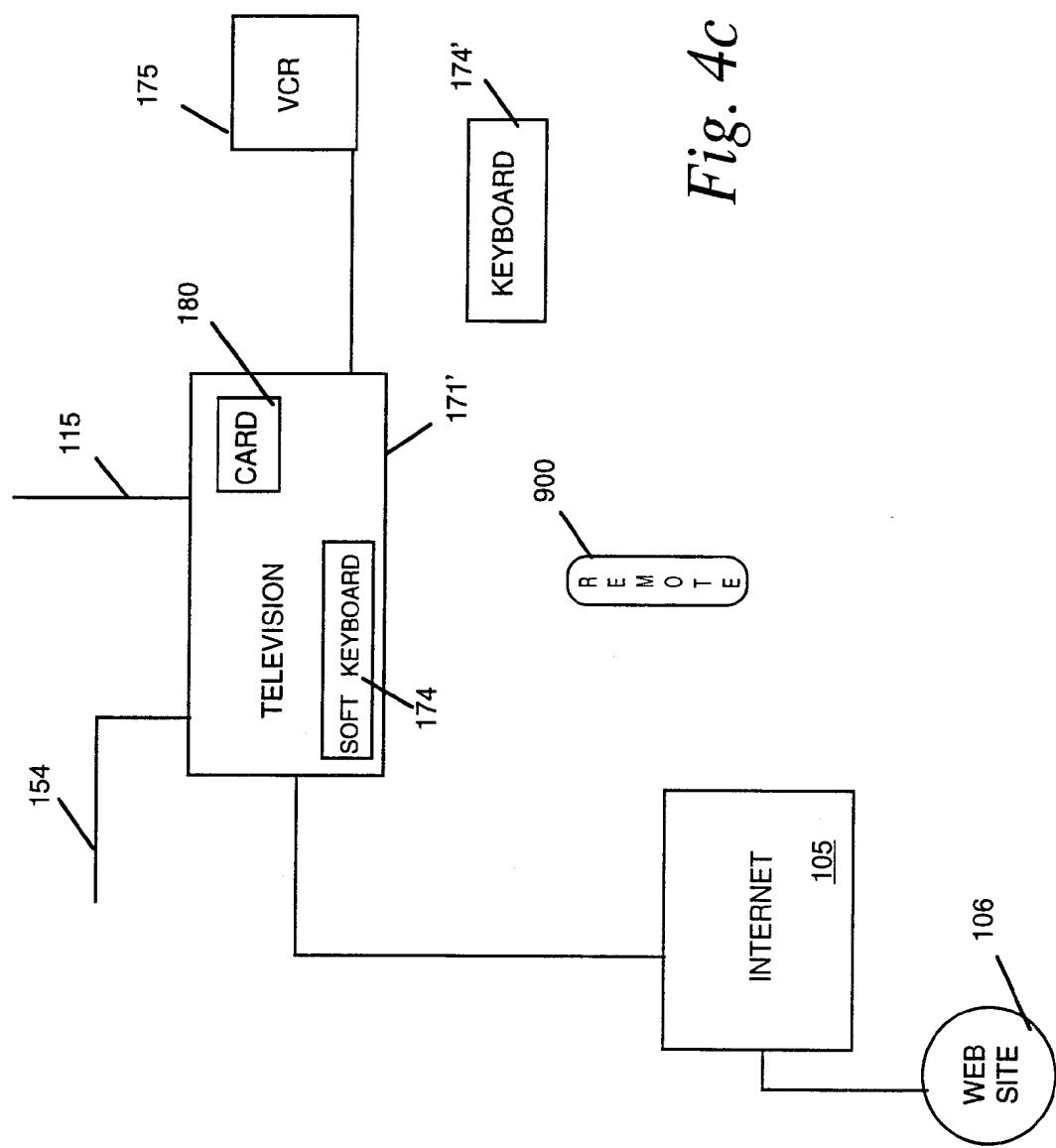
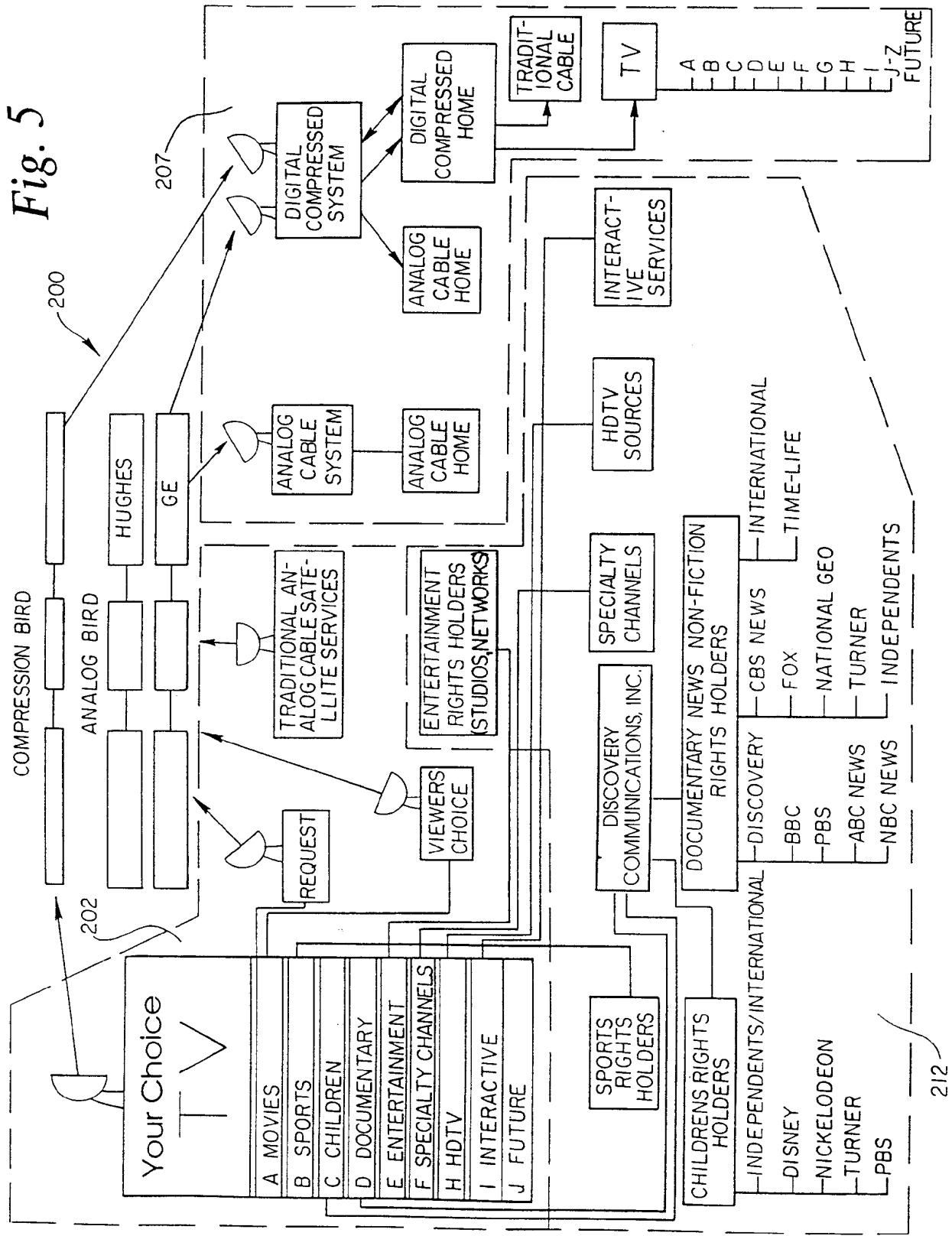


Fig. 4c

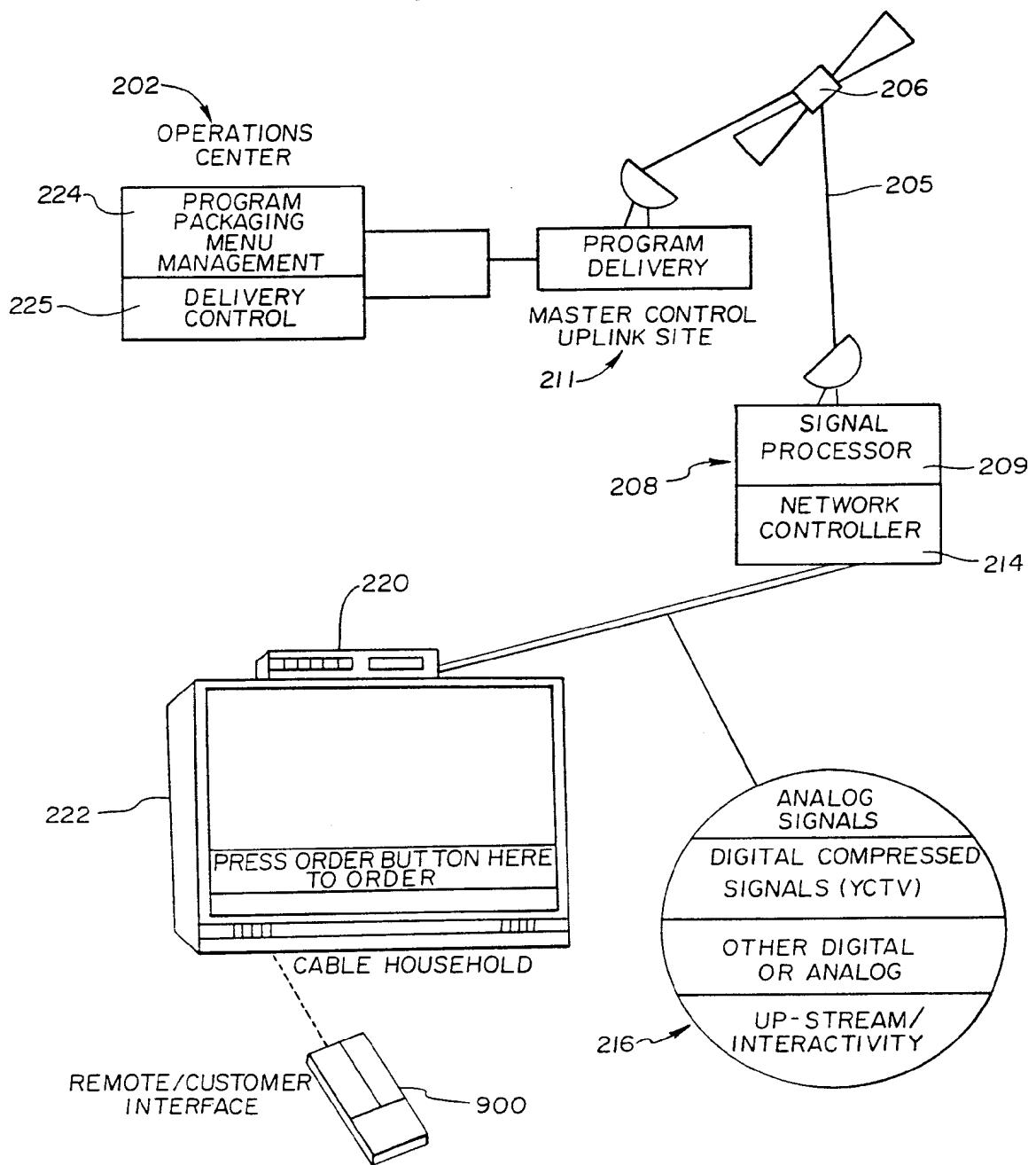
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Fig. 5



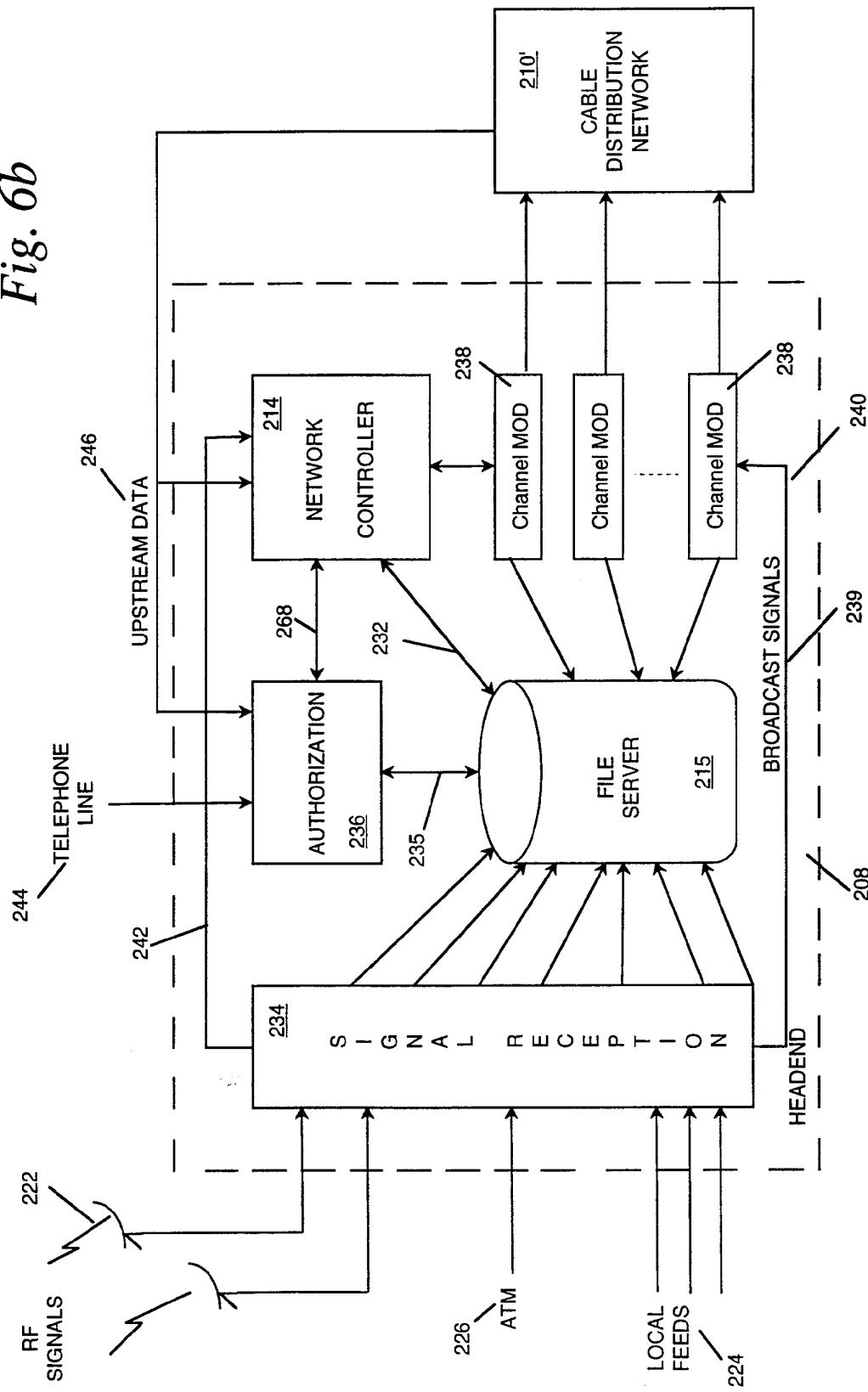
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Fig. 6a



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Fig. 6b



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Fig. 6c

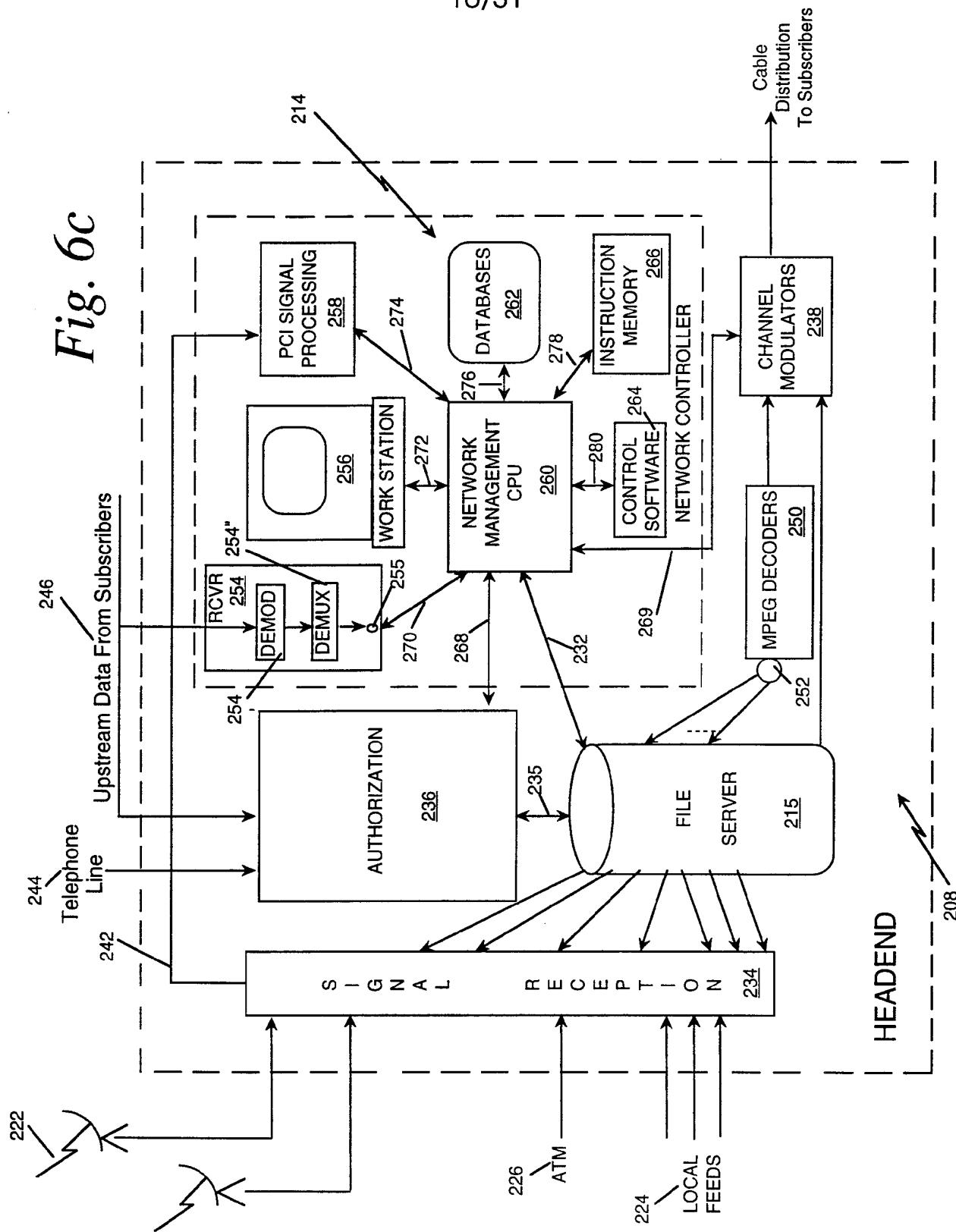


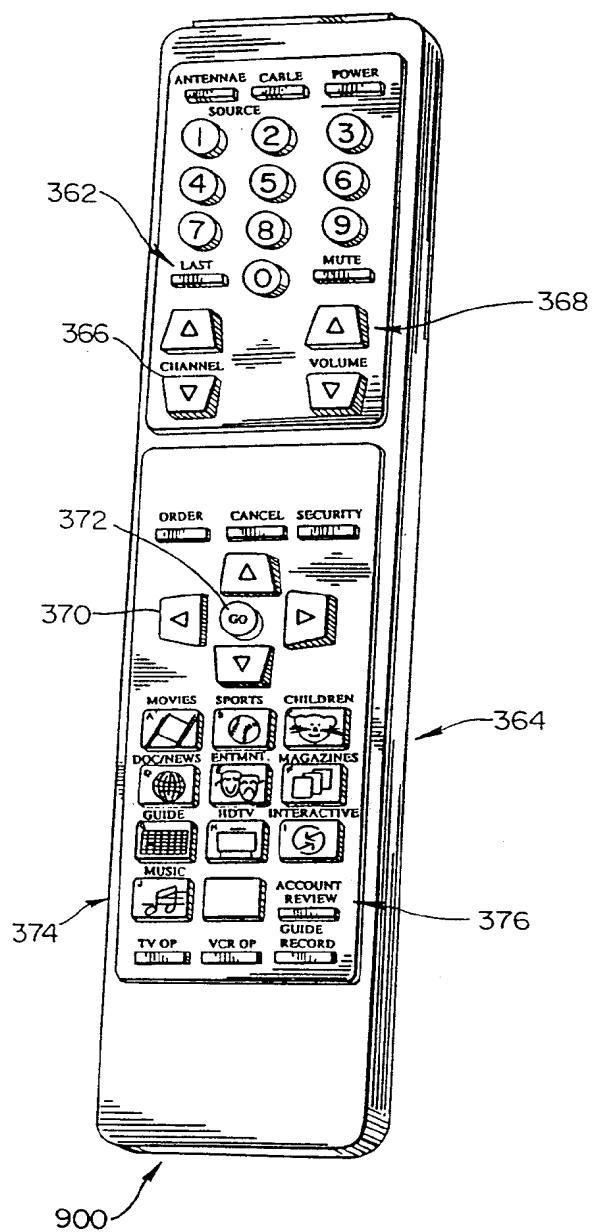
Fig. 7

Fig. 8

CHANNEL	12 - 1	1 - 2	2 - 3	3 - 4
1 (Free)	HDTV- Simpsons	HDTV - Cheers	HDTV - King of the Hill	HDTV - Seinfeld
2 (PPV - 4.95)	No Program	NFL Football - Colts v. Packers	NFL Football - Colts v. Packers	NFL Football - Colts v. Packers
3 (PPV - 4.95)	No Program	NFL Football - Chiefs v. Raiders	NFL Football - Chiefs v. Raiders	NFL Football - Chiefs v. Raiders
4 (PPV - 1.95)	Terminator IV (R)	Terminator IV (R)	Aliens X (R)	Aliens X (R)
5 (PPV - 1.95)	King Lear (PG-13)	King Lear (PG-13)	King Lear (PG-13)	King Lear (PG-13)
6 (PPV - 1.95)	Gone With the Wind (G)	Gone With the Wind (G)	Gone With the Wind (G)	Gone With the Wind (G)
7 (Free)	Meet the Press	This Old House	Fly Fishing	Tennis
8 (Free)	NFL Today	Meet the Press	This Old House	Golf

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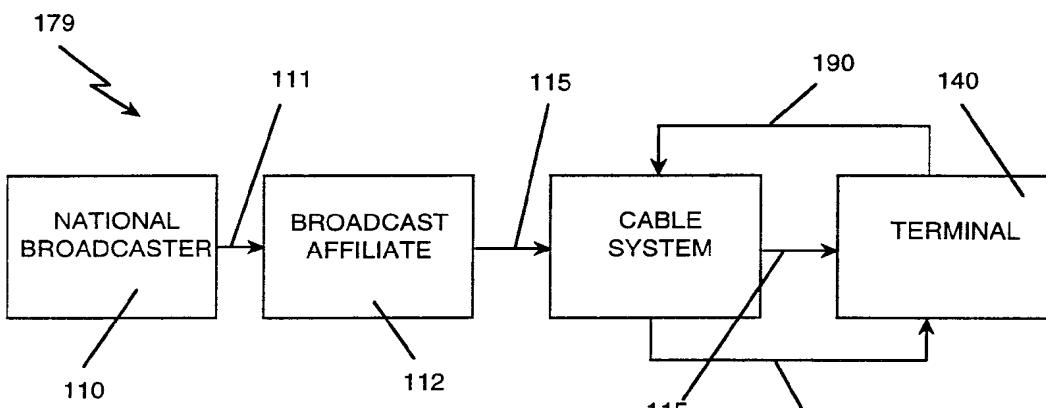


Fig. 9a

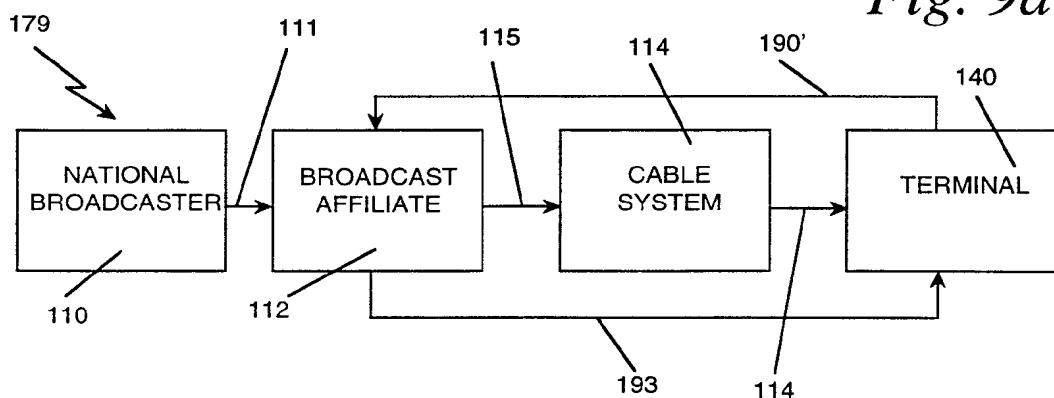


Fig. 9b

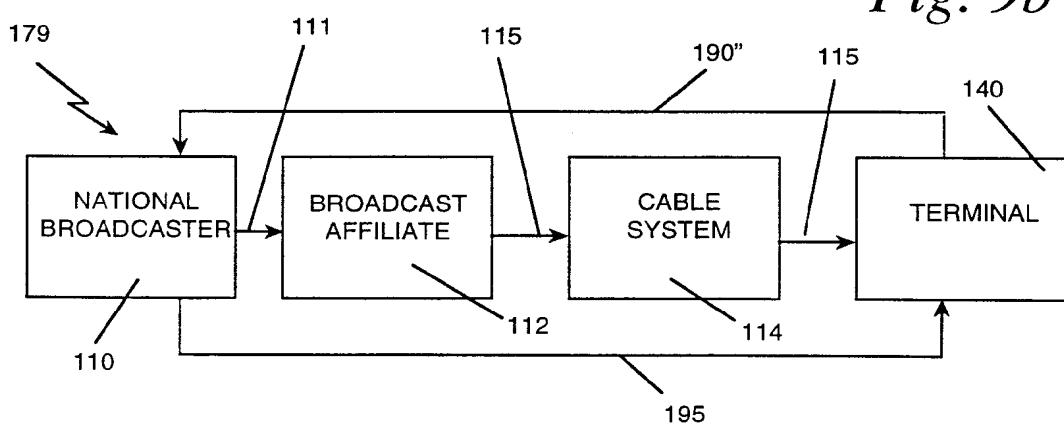


Fig. 9c

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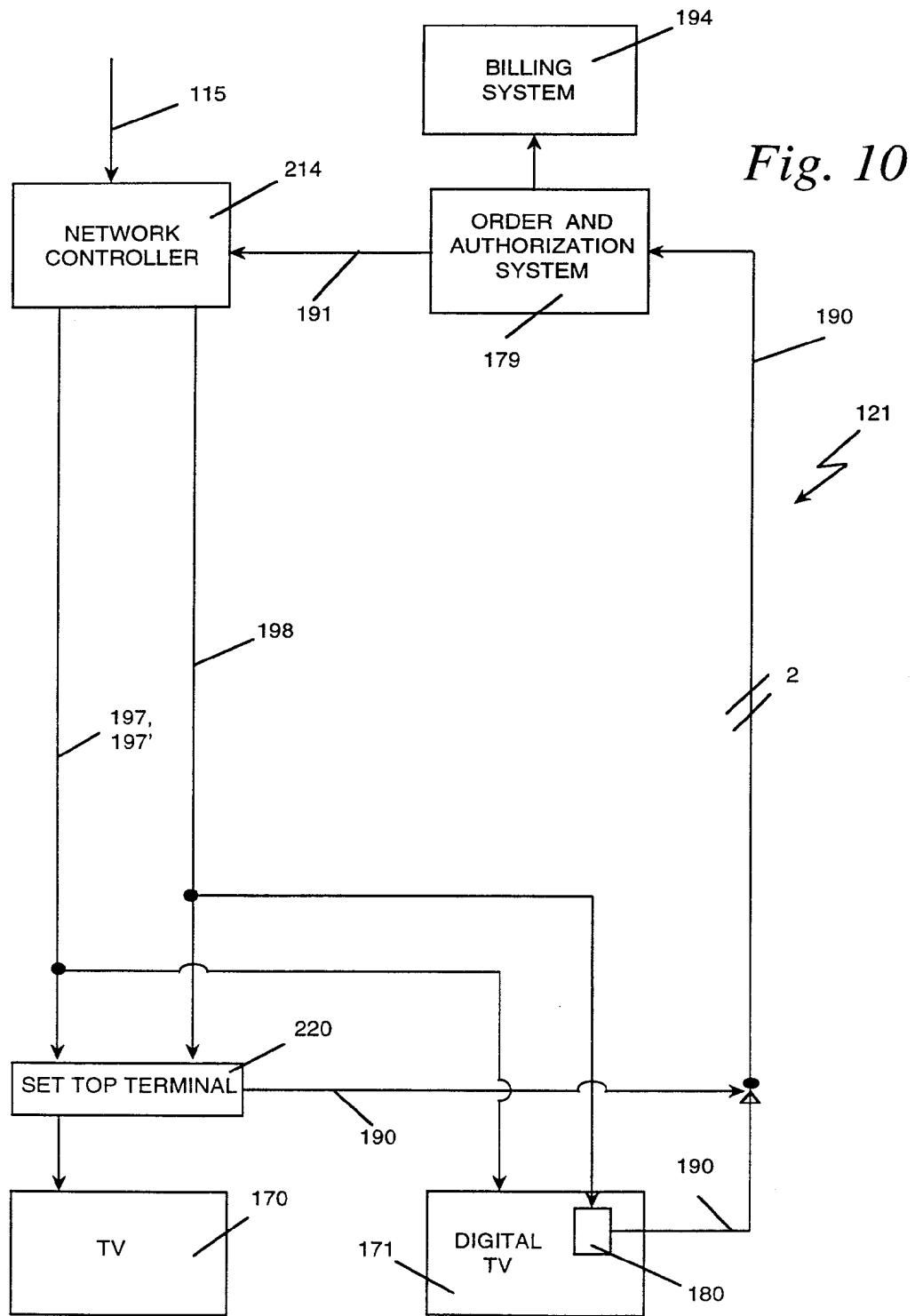
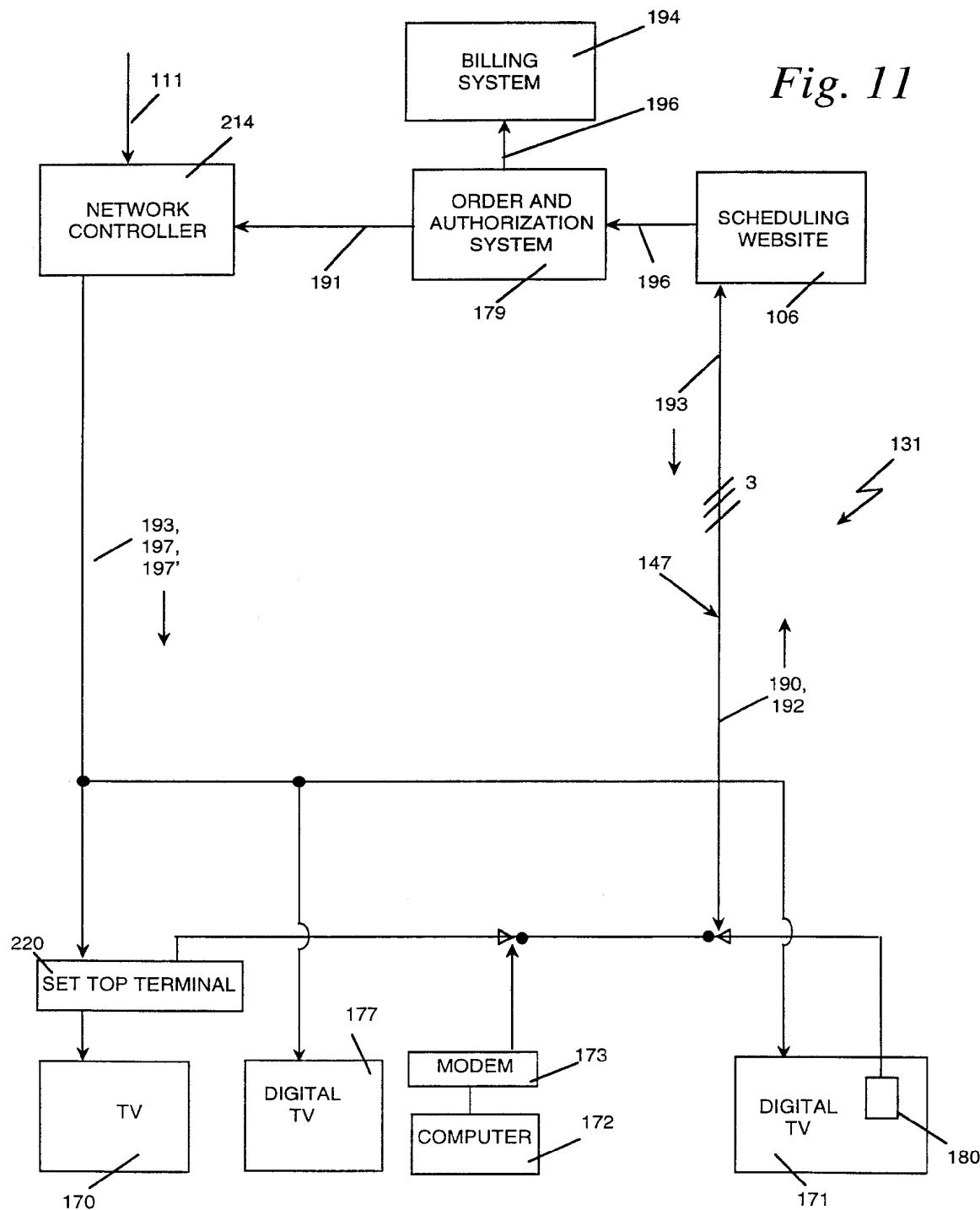
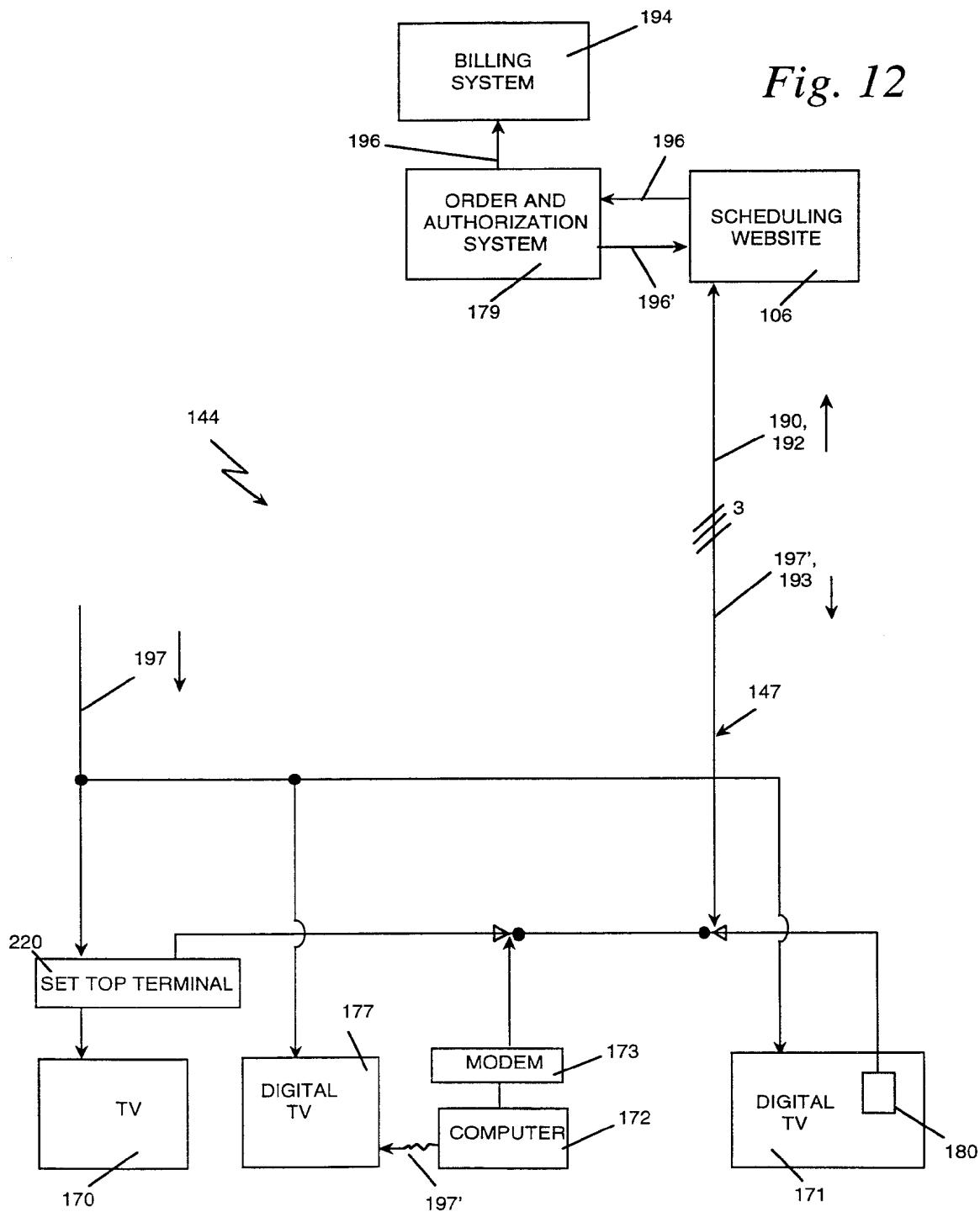


Fig. 10

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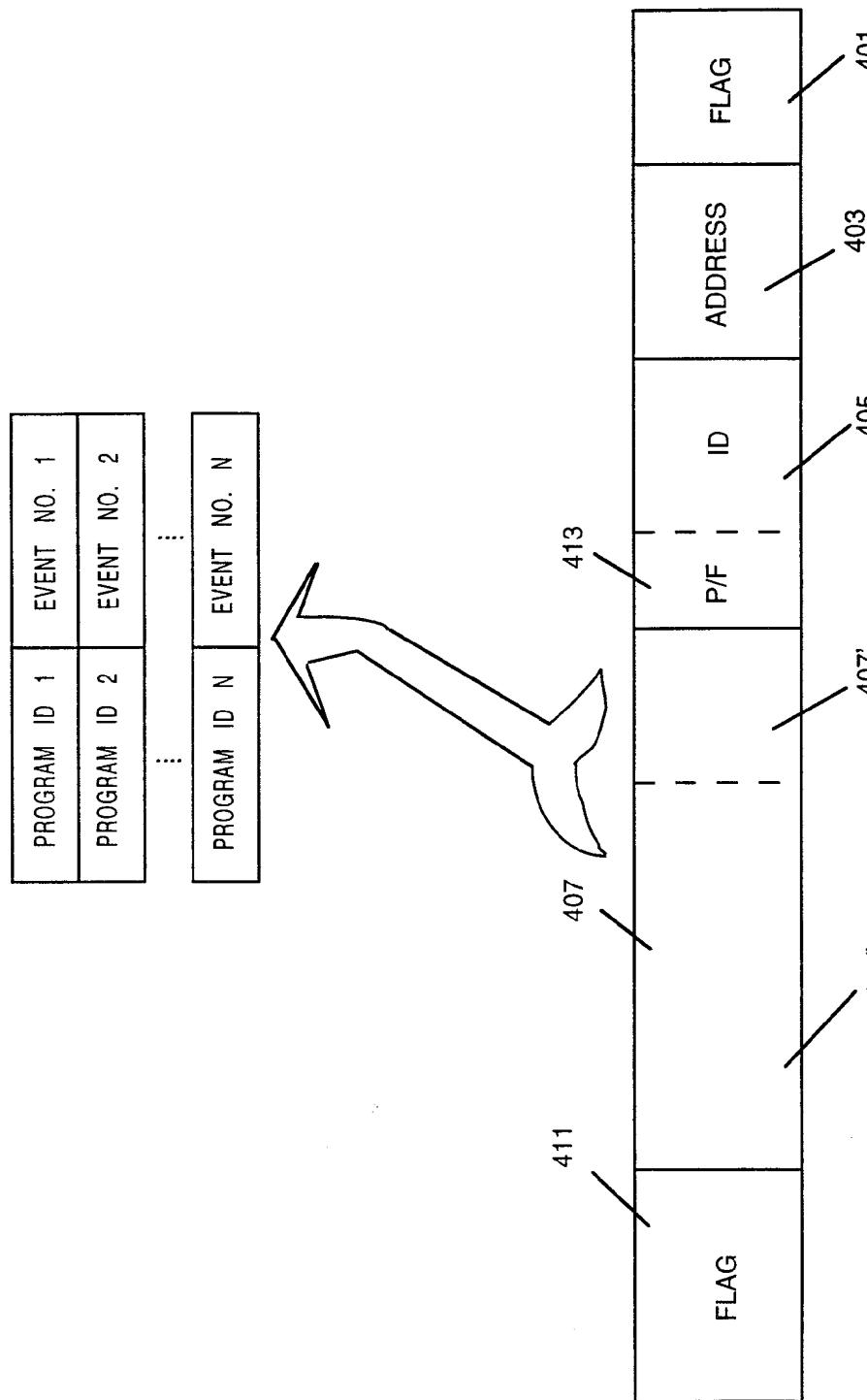


Fig. 13

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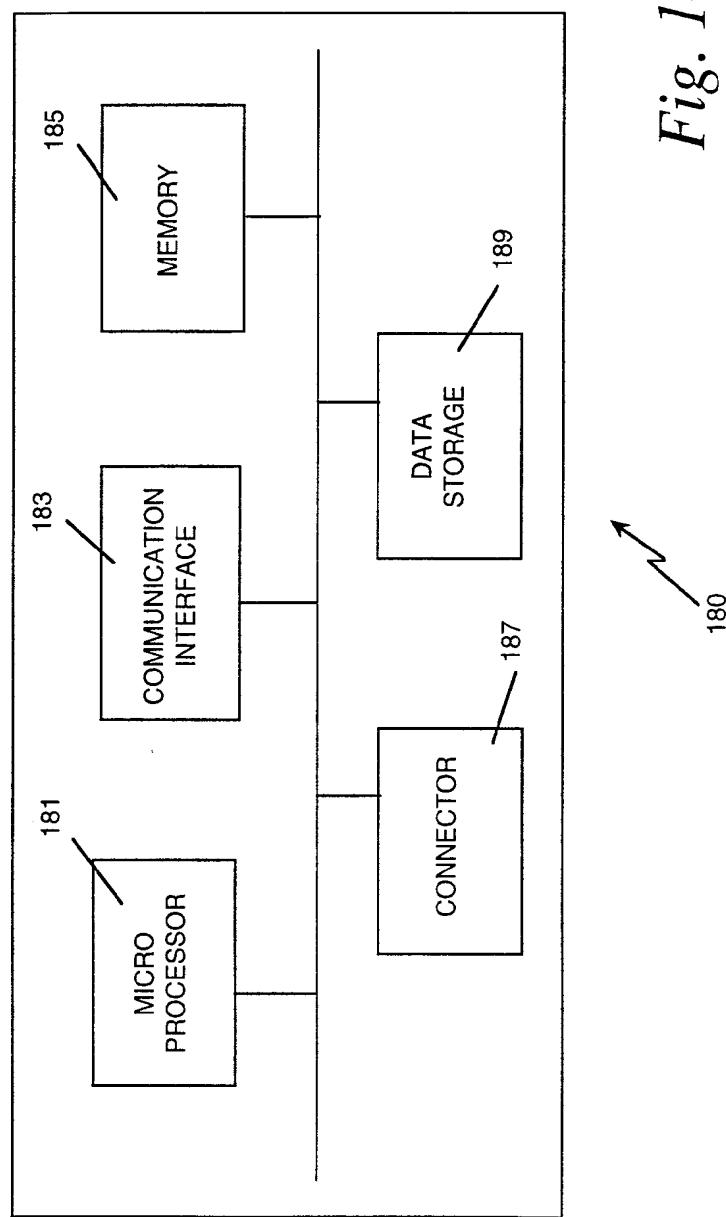
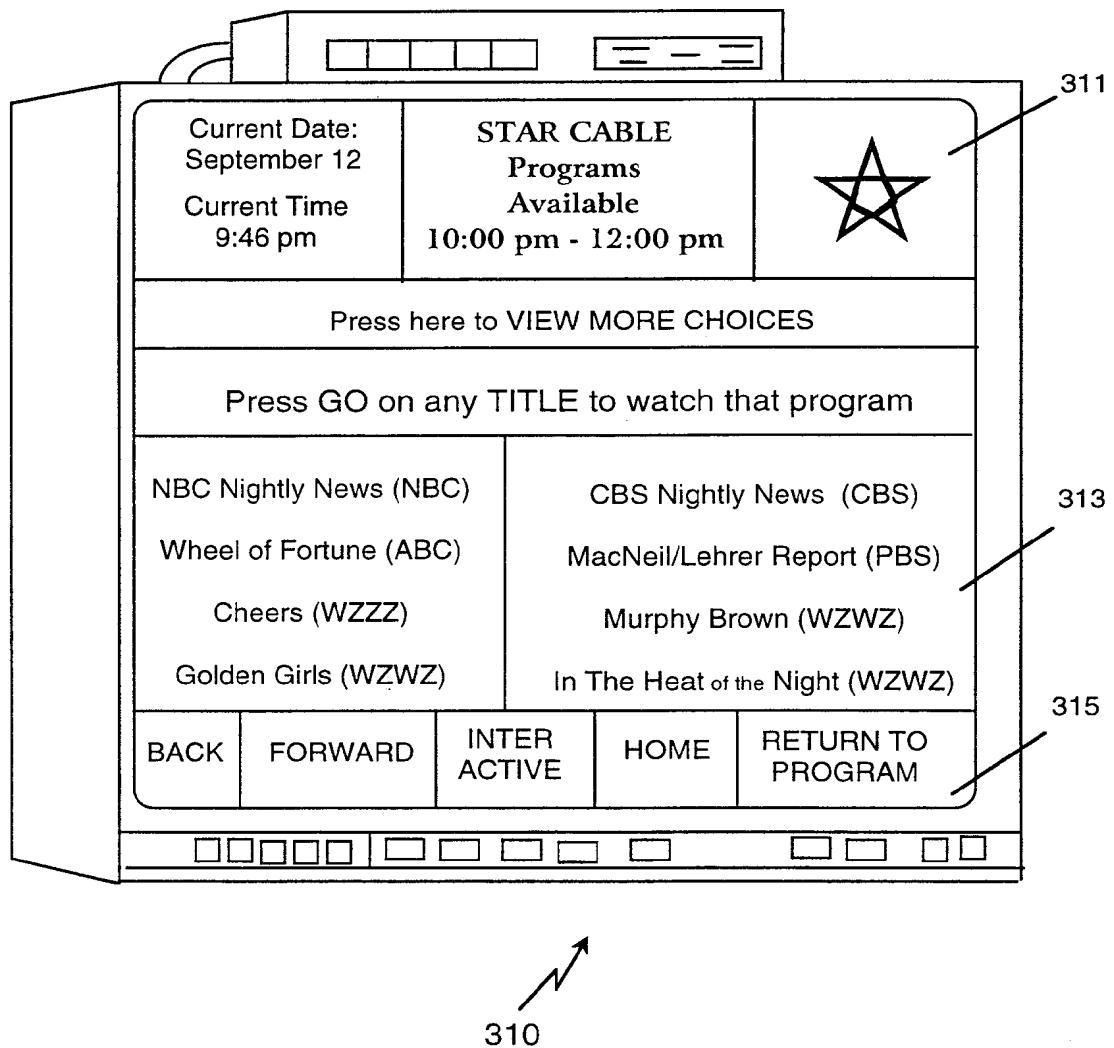
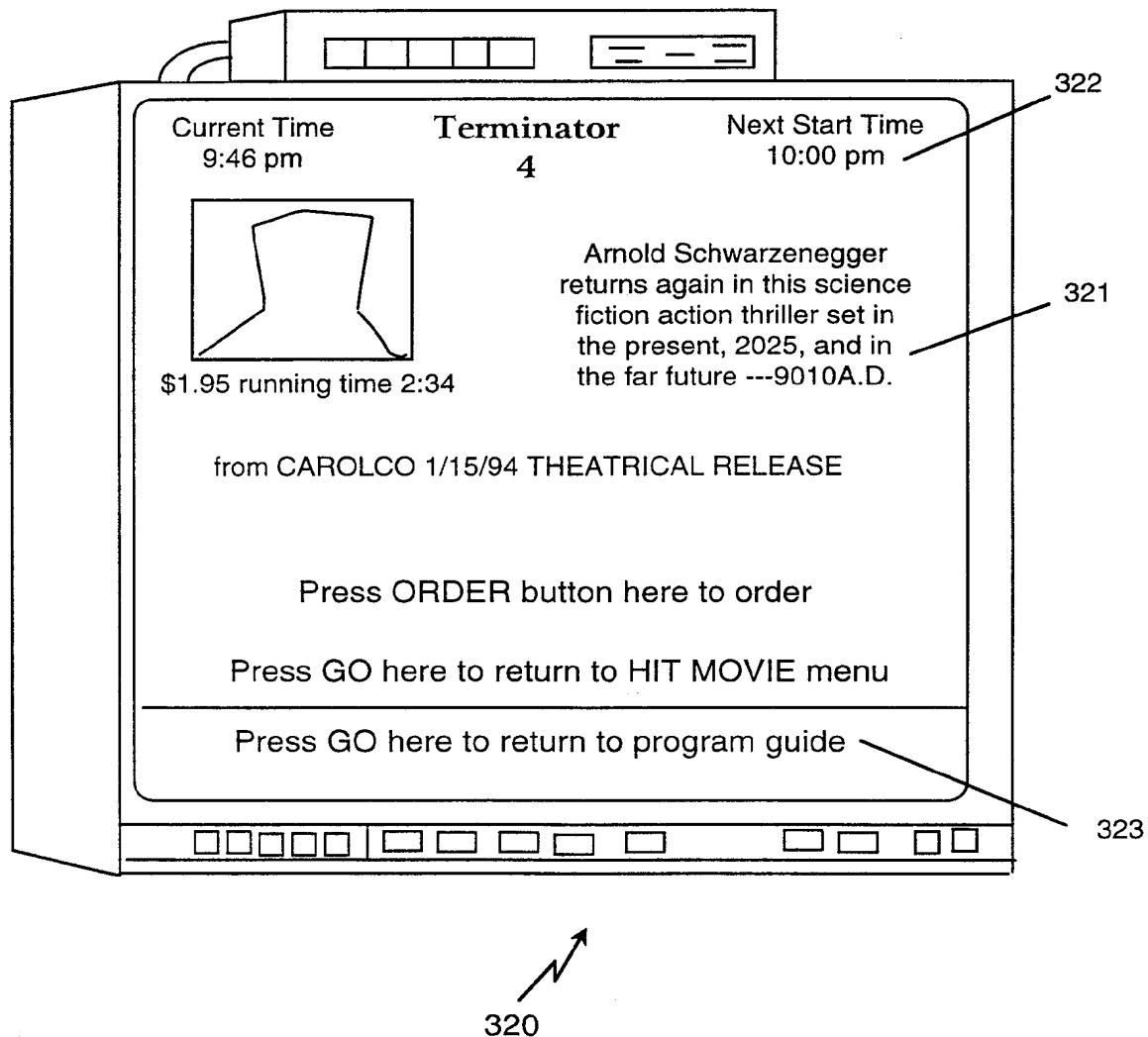


Fig. 14

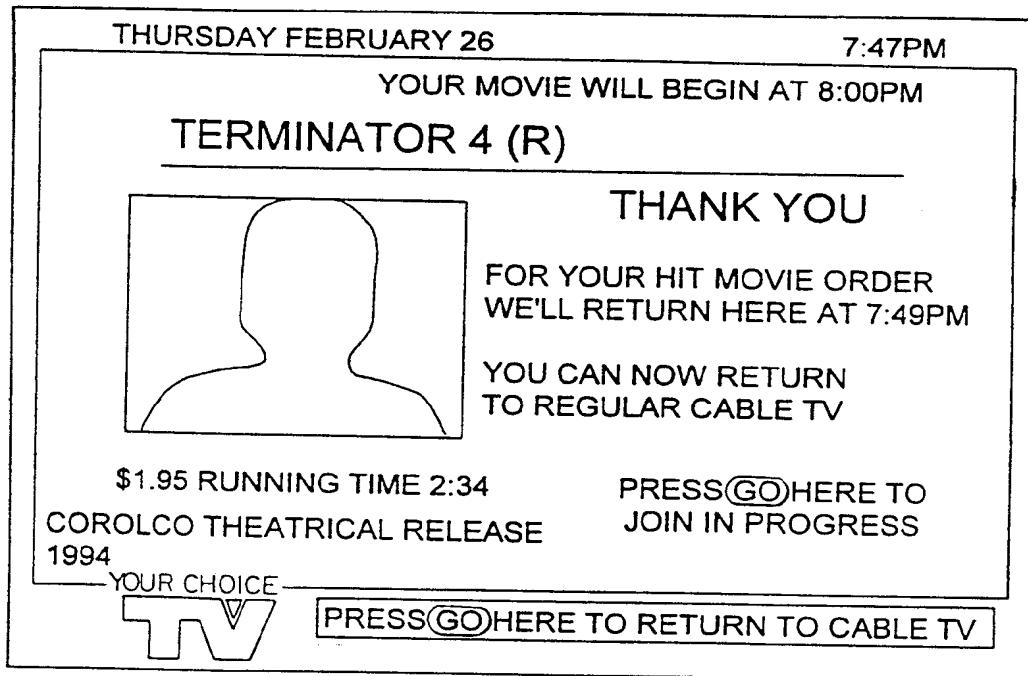
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Fig. 15a

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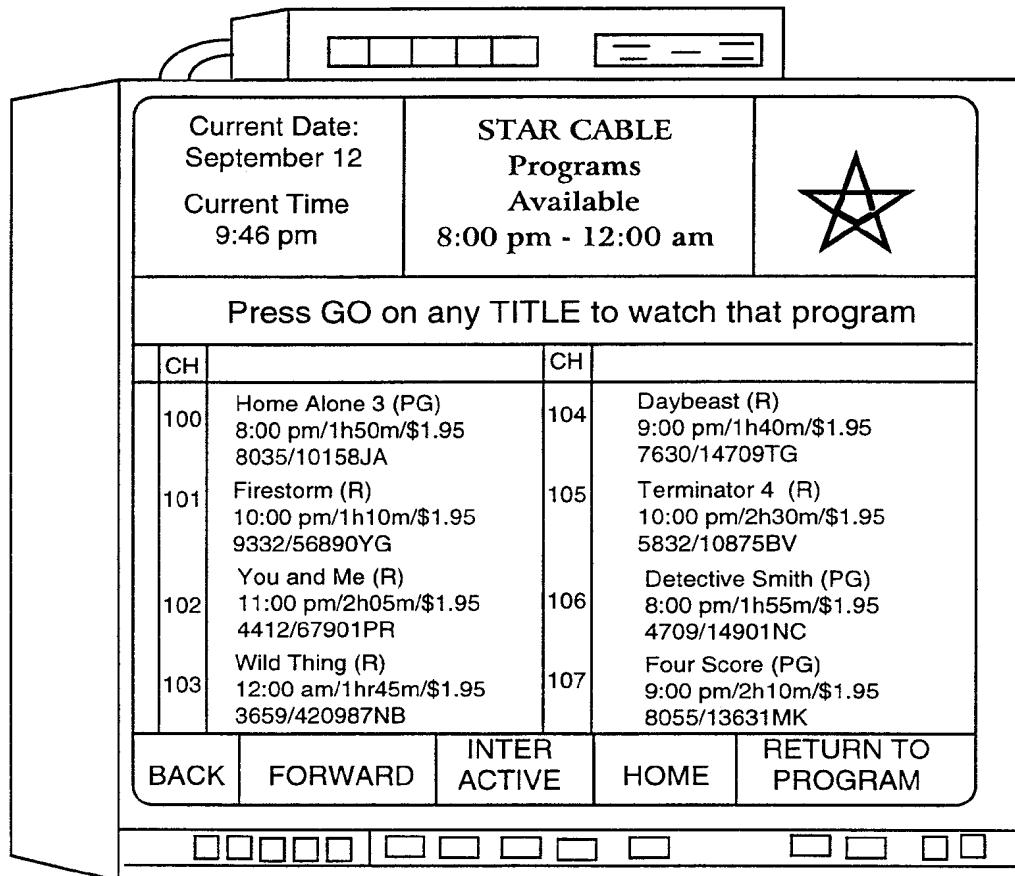
Fig. 15b

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Fig. 15c

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Fig. 15d



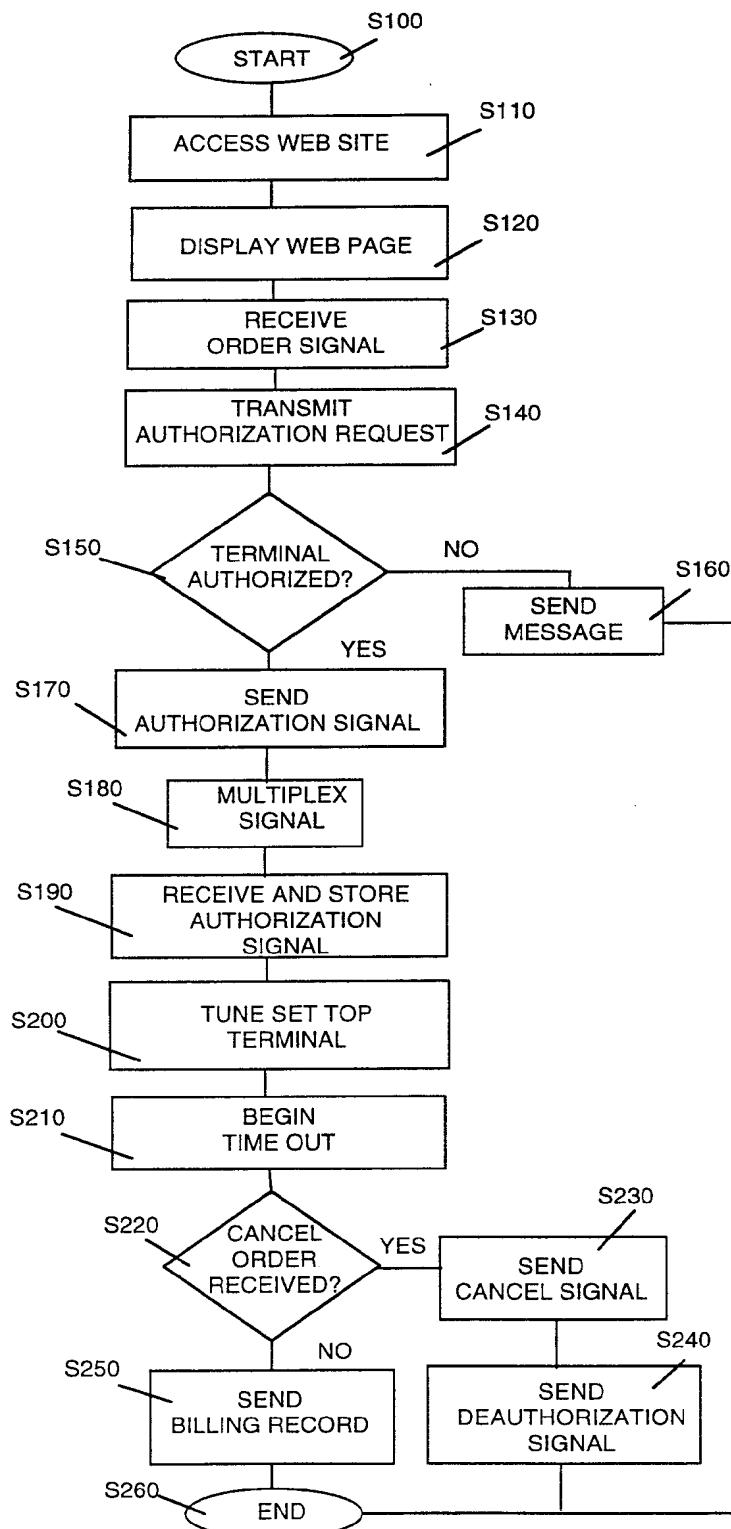


Fig. 16

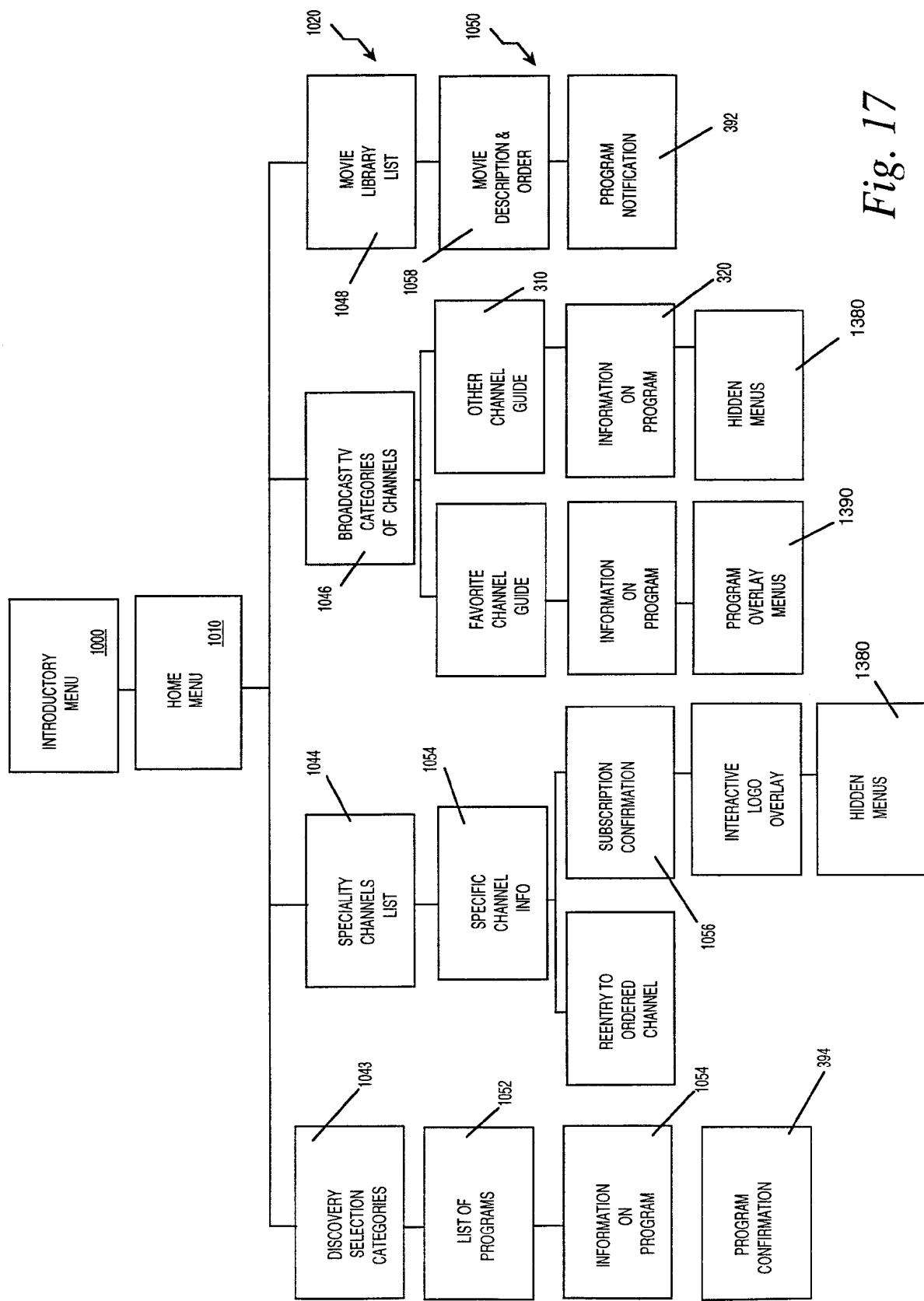


Fig. 17

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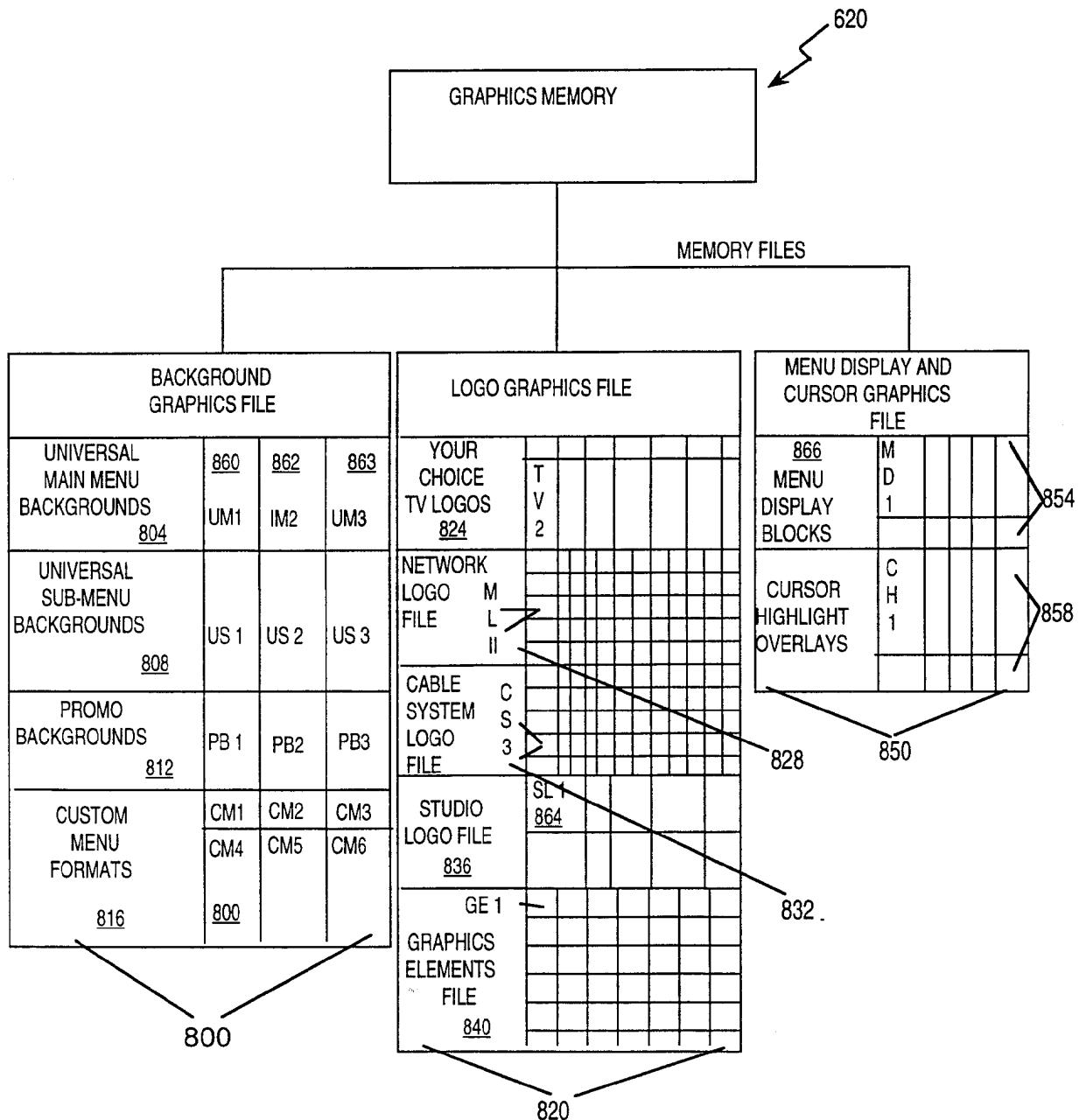


Fig. 18a

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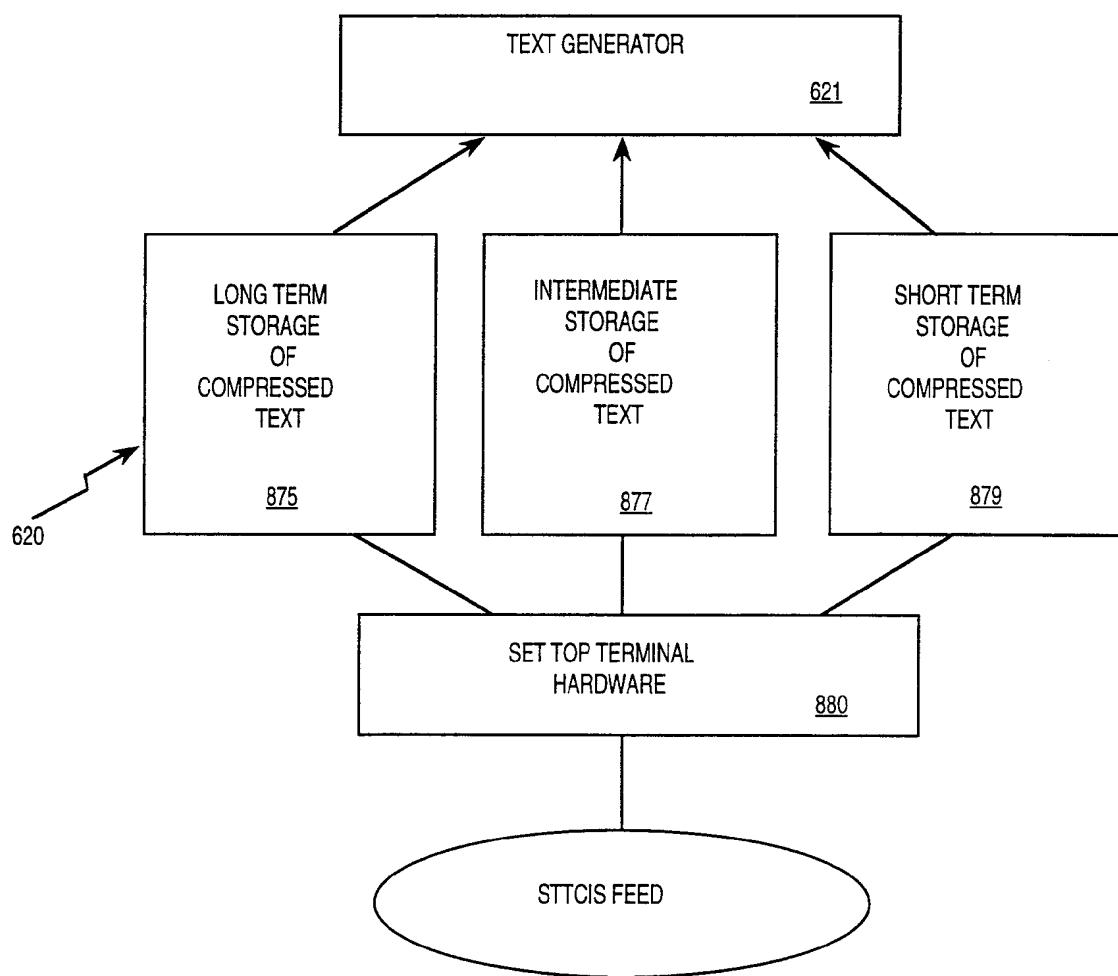


Fig. 18b

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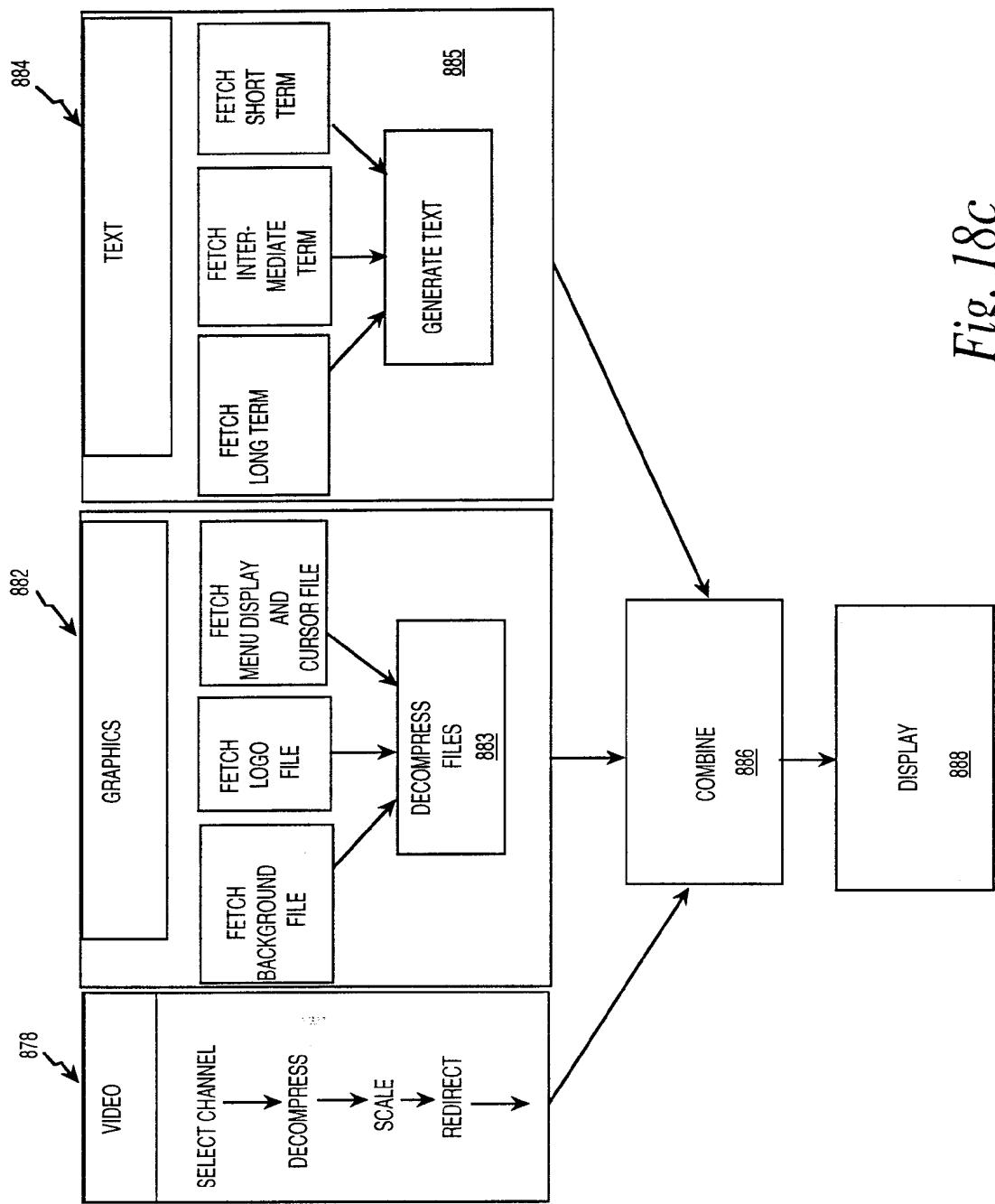


Fig. 18c

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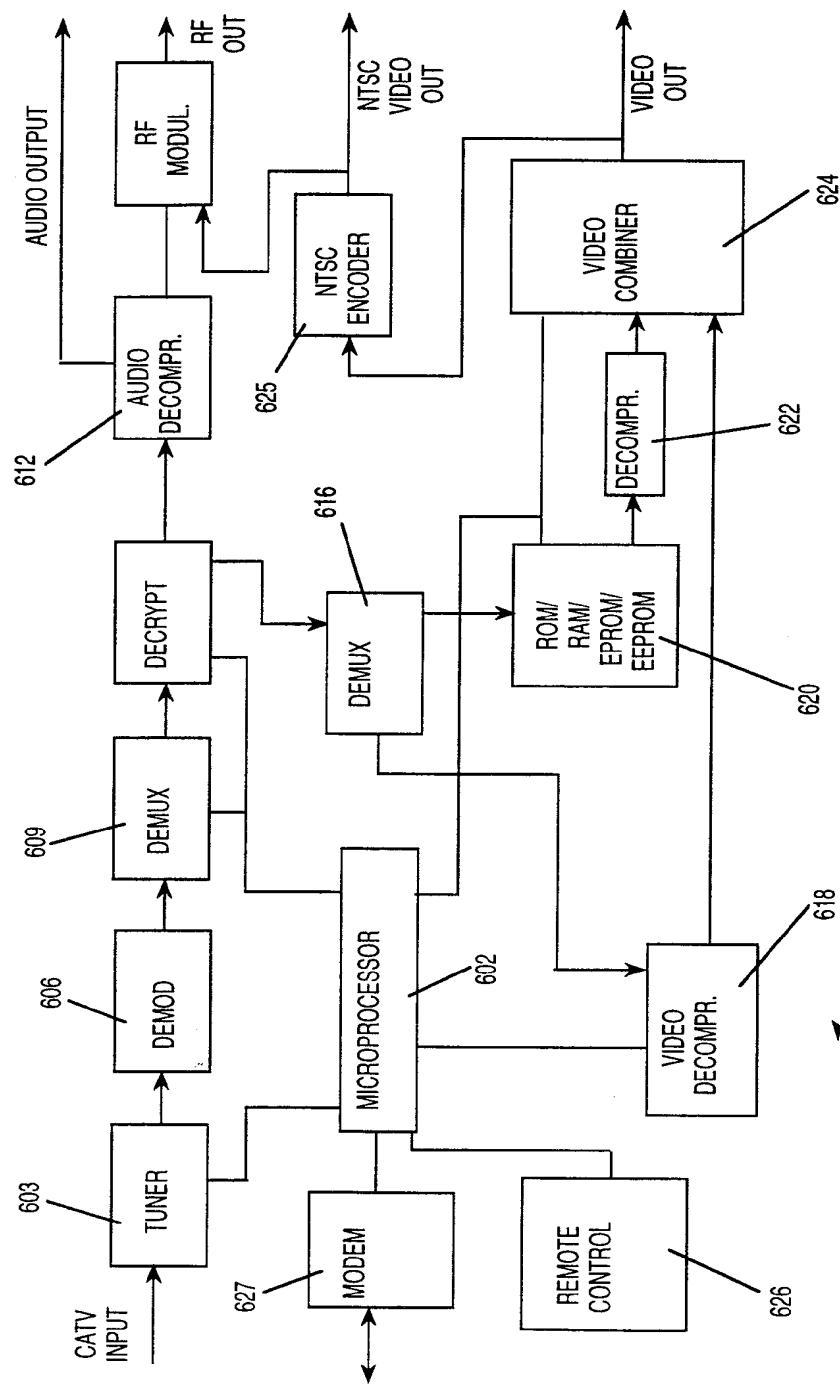


Fig. 19

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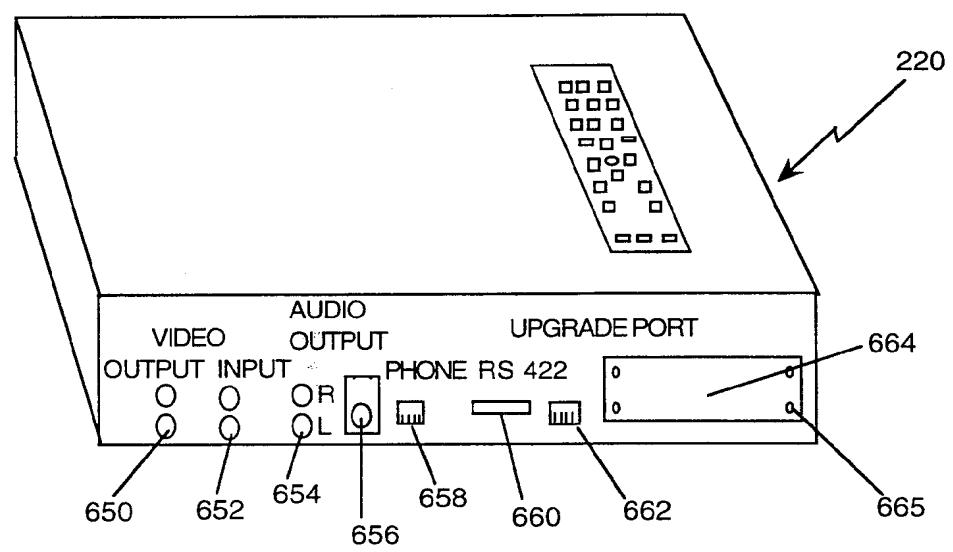
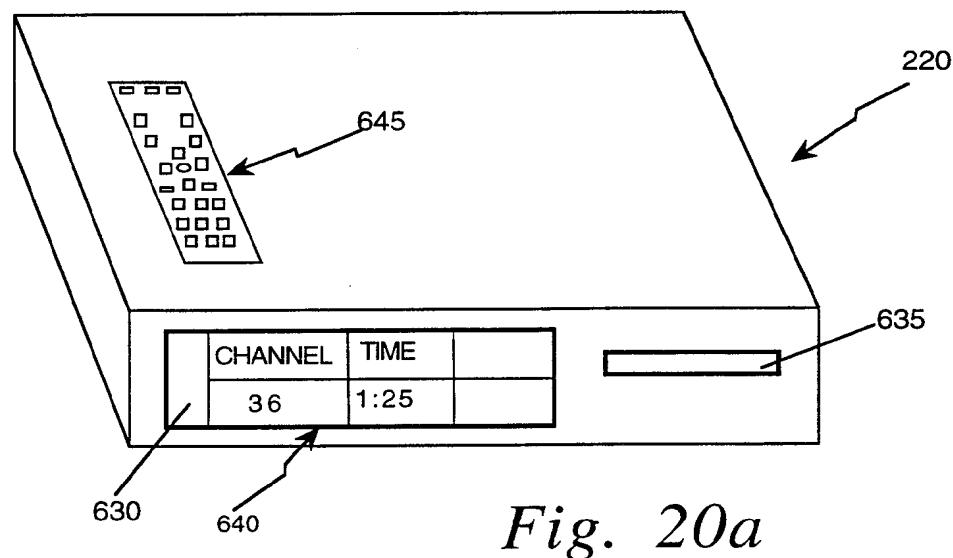


Fig. 20b

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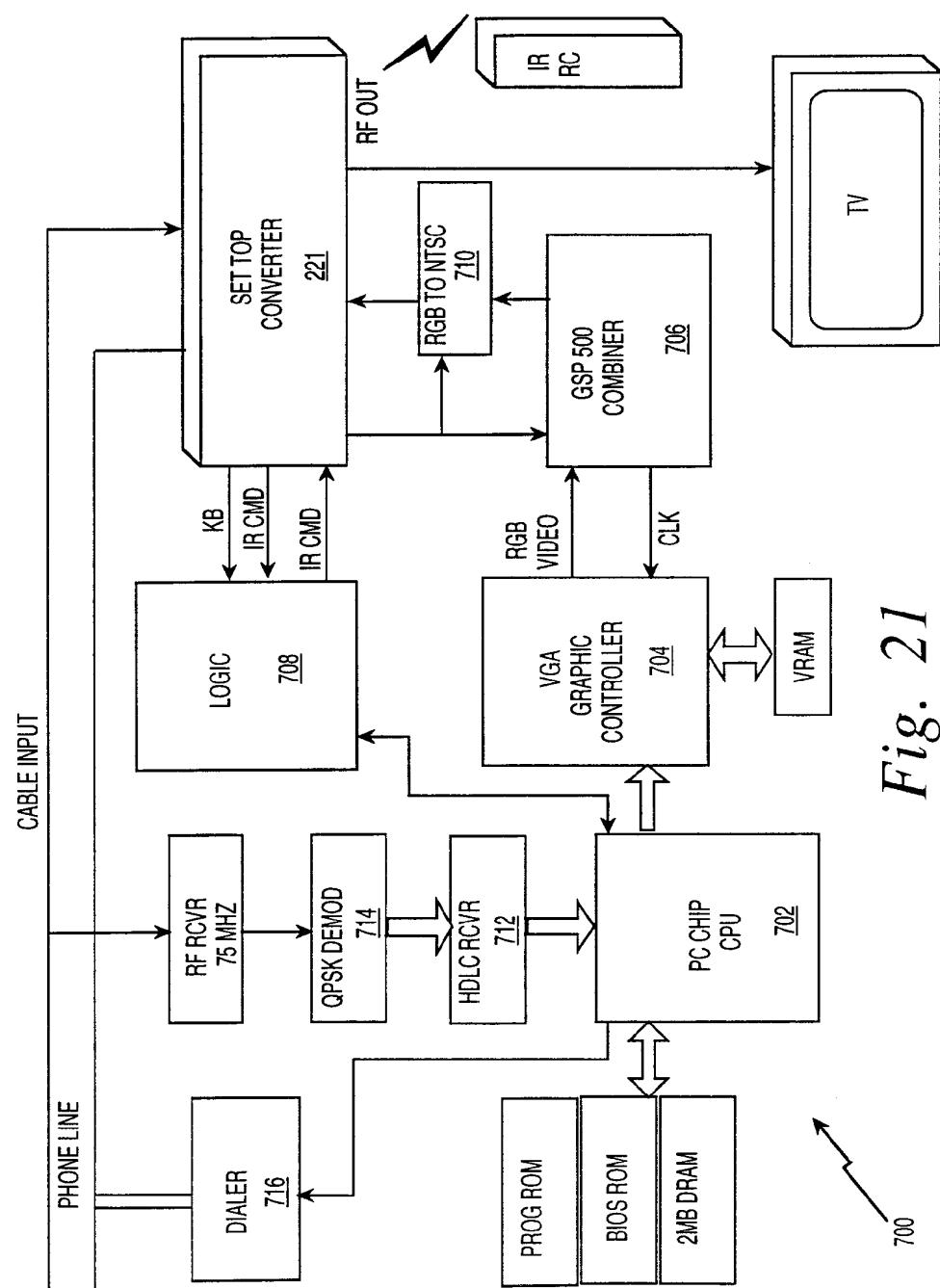


Fig. 21

8 BITS 4 BITS 4 BITS 16 BITS VARIABLE 8 BITS

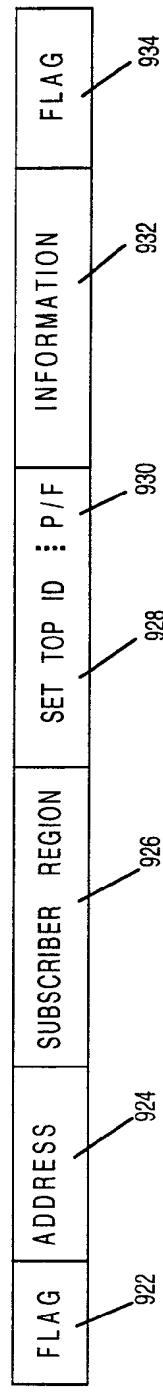


Fig. 22a

8 BITS 4 BITS 4 BITS 16 BITS VARIABLE 8 BITS

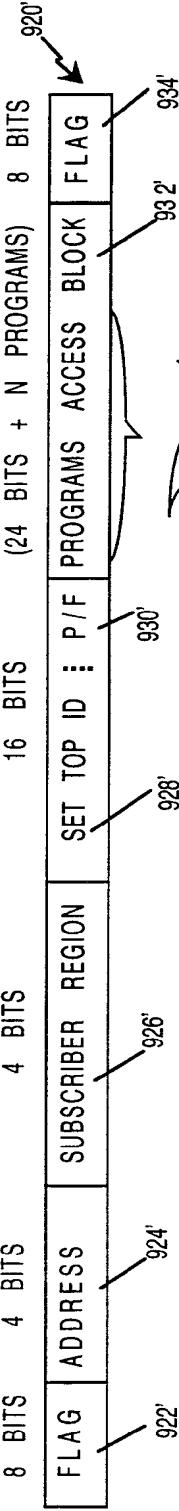
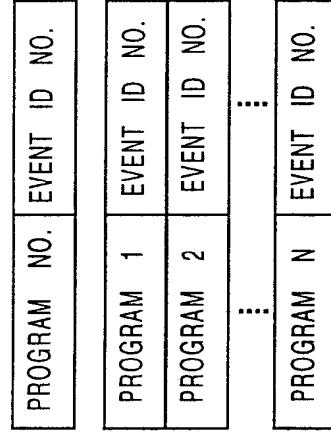


Fig. 22b



INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/26479

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04N7/16 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 94 14282 A (DISCOVERY COMMUNICAT INC) 23 June 1994 (1994-06-23) cited in the application	1-141, 151-198
Y	the whole document ---	142-150
Y	WO 96 25006 A (FLEXYDIAL PTY LTD ;GOSNEY PETER JOHN (AU)) 15 August 1996 (1996-08-15)	142-150
A	page 3, line 20 - line 29 page 5, line 6 - line 24 page 19, line 17 -page 20, line 7 ---	33-36, 84, 85, 125, 126, 144
		-/--

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

21 February 2000

Date of mailing of the international search report

25/02/2000

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Authorized officer

Van der Zaal, R

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/26479

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 13368 A (STARLIGHT TELECAST INCORPORATED) 10 April 1997 (1997-04-10) page 8, line 15 -page 9, line 17 page 10, line 1 -page 11, line 36 page 16, line 21 -page 17, line 39 page 19, line 36 -page 29, line 26 page 30, line 8 -page 35, line 37 -----	1-198

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No

PCT/US 99/26479

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO 9414282	A 23-06-1994	AT 177277 T		15-03-1999
		AT 176840 T		15-03-1999
		AT 183352 T		15-08-1999
		AT 176841 T		15-03-1999
		AU 4440797 A		29-01-1998
		AU 712157 B		28-10-1999
		AU 4532597 A		05-02-1998
		AU 693775 B		09-07-1998
		AU 5732994 A		04-07-1994
		AU 692427 B		11-06-1998
		AU 5733094 A		04-07-1994
		AU 691479 B		21-05-1998
		AU 5733194 A		04-07-1994
		AU 692428 B		11-06-1998
		AU 5733294 A		04-07-1994
		AU 5736394 A		04-07-1994
		AU 5845894 A		22-06-1994
		AU 5869894 A		04-07-1994
		AU 6066798 A		04-06-1998
		AU 6066898 A		04-06-1998
		BR 9307619 A		15-06-1999
		BR 9307620 A		10-08-1999
		BR 9307621 A		15-06-1999
		BR 9307622 A		15-06-1999
		BR 9307624 A		15-06-1999
		BR 9307625 A		31-08-1999
		CA 2151456 A		23-06-1994
		CA 2151457 A		23-06-1994
		CA 2151458 A		23-06-1994
		CA 2151459 A		23-06-1994
		CA 2151460 A		23-06-1994
		CA 2151461 A		09-06-1994
		CA 2151462 A		23-06-1994
		CN 1093211 A		05-10-1994
		CN 1090451 A		03-08-1994
		CN 1090452 A		03-08-1994
		CN 1096151 A		07-12-1994
		CN 1090453 A		03-08-1994
		CN 1090454 A		03-08-1994
		DE 69323560 D		25-03-1999
		DE 69323560 T		23-09-1999
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		DE 69323767 D		08-04-1999
		DE 69323767 T		21-10-1999
		DE 69326020 D		16-09-1999
		EP 0673578 A		27-09-1995
		EP 0673579 A		27-09-1995
		EP 0673580 A		27-09-1995
		EP 0673581 A		27-09-1995
WO 9625006	A 15-08-1996	AU 695508 B		13-08-1998
		AU 4614096 A		27-08-1996
		JP 11500275 T		06-01-1999
		SG 34383 A		06-12-1996
WO 9713368	A 10-04-1997	AU 7387196 A		28-04-1997
		BR 9611064 A		13-07-1999

INTERNATIONAL SEARCH REPORT
Information on patent family members

Inte International Application No

PCT/US 99/26479

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9713368	A	CA 2232003 A	10-04-1997
		CN 1200221 A	25-11-1998
		EP 0880856 A	02-12-1998
		JP 10512420 T	24-11-1998
		US 6002394 A	14-12-1999